

ANNUAL REPORT
OF THE
BOARD OF STATE VITICULTURAL
COMMISSIONERS,
FOR
1887

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ANNUAL REPORT

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Board of State Viticultural Commissioners,

FOR 1887.



SACRAMENTO:

STATE OFFICE : : : : J. D. YOUNG, SUPT. STATE PRINTING.
1888.

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OFFICERS AND MEMBERS

OF THE

BOARD OF STATE VITICULTURAL COMMISSIONERS.

ARPAD HARASZTHY.....	President, Commissioner for the State at Large.
CHARLES A. WETMORE	Vice-President, Commissioner for the San Francisco District.
CHARLES KRUG	Treasurer, Commissioner for the Napa District.
I. DETURK	Commissioner for the Sonoma District.
W. S. MANLOVE	Commissioner for the Sacramento District.
GEORGE WEST	Commissioner for the San Joaquin District.
L. J. ROSE	Commissioner for the Los Angeles District.
G. G. BLANCHARD	Commissioner for the El Dorado District.
J. DEBARTH SHORB	Commissioner for the State at Large.
CLARENCE J. WETMORE.....	Secretary.
JOHN H. WHEELER	Chief Executive Viticultural and Health Officer.

STANDING COMMITTEES:

Executive—I. DeTurk, George West, and W. S. Manlove.

Auditing—W. S. Manlove.

Finance—L. J. Rose and J. DeBarth Shorb.

On Phylloxera, Vine Pests, and Diseases of the Vine—I. DeTurk, George West, and W. S. Manlove.

On Conference with Board of Regents of State University—Arpad Haraszthy, Charles A. Wetmore, and Charles Krug.

On Instructions for the Office of the Chief Executive Viticultural Officer—Arpad Haraszthy, Charles Krug, and I. DeTurk.

On Distillation, Counterfeits, and Adulterations—J. DeBarth Shorb, Charles Krug, and George West.

On Raisins and Table Grapes—George West, L. J. Rose, and W. S. Manlove.

On Compensation to be Paid the Chief Executive Officer—Charles Krug, I. DeTurk, and George West.

Offices of the Board :

204 MONTGOMERY STREET, SAN FRANCISCO.

REPORT

OF

ARPAD HARASZTHY,

President of the California State Board of Viticultural Commissioners.

SAN FRANCISCO, April 12, 1888.

To his Excellency R. W. WATERMAN, Governor of the State of California :

SIR: Herewith you will find transmitted my annual report for 1887-8 as President of the State Board of Viticultural Commissioners, together with other documents necessary thereto.

Owing to your recent succession to the gubernatorial chair through the death of the late Governor Bartlett, it is the first report you will have received from me; and as my term of office expires by limitation on the nineteenth of this month, it will also be the last I will be called upon to make during your administration. In view of these facts, I deem it necessary, for your information, to dwell at some length on the work accomplished for the benefit of the State by this Board. This is the more necessary since, *in certain quarters* there exists, apparently, a *determined ignorance* regarding the work accomplished by this Commission, as well as a *sustained endeavor* to cloud the great actual value of its labors.

Respectfully,

ARPAD HARASZTHY,
President of the California Board of State Viticultural Commissioners.

REPORT.

SIR: The old Mission fathers planted the grapevine in California immediately or shortly after their arrival, previous to 1770. They planted small tracts close around their Missions, guarded them jealously with high adobe walls, cultivated them carefully, gathered their fruit, and made wine. These wines, so far as we can learn, did not enter into the trade of those days, but were consumed by the good fathers, their occasional visitors, and their immediate retainers. Even after the arrival of Americans in 1849, and with them representatives from every civilized nationality on the globe, but little advance was made towards increasing the area of viticulture, until the year 1858, when, through the publication of vine articles in the reports of the State Agricultural Society, and in the newspapers, a general and widespread interest manifested itself in vine planting, and the area of our vineyards became very greatly increased. A very large proportion, however, of these new plantations consisted of table grape producing vines, and the remainder was almost exclusively composed of the old Mission variety.

Towards 1862, vine planting arose to a genuine enthusiasm, and a lively interest was shown in selecting better varieties for the table, for the wine press, and for raisin curing.

Of the three Commissioners appointed by Governor Downey in 1861 "to report upon the best means and ways to promote the improvement and culture of the grapevine in California," Don Juan Warner returned a clear, concise report on the state of vine culture at that period within the limits of our State. On the other hand, the late Agoston Haraszthy went to Europe, and after visiting all its most important viticultural districts, made an elaborate report on the European methods of cultivating the vine, making wine, and curing of raisins, adding practical suggestions to the California vine grower, and at the same time bringing two hundred thousand grapevine cuttings and rooted vines of every attainable variety to be found in Europe, Asia Minor, Persia, and Egypt. These were afterwards gradually distributed in small lots to different parts of the State, and formed invaluable nuclei for experimentation. No report was ever received from the third member of the above Commission.

Towards 1870 the production of wine and table grapes became greater than the demand, and our viticultural industry began to lag, and finally became so discouraging that in 1875 many vineyards were either abandoned, uprooted, or replaced by orchards and grain fields.

In 1879 the demand for table raisins and wine grapes caught up with the supply, and a renewed interest was awakened in viticulture. Our raisins were looked upon with charity in the East, our rich clusters of table grapes admired and sought for, while our wines, though still very crude, had found more numerous and less exacting customers.

Up to 1880 those who believed in the value of varieties of grapes for wine making, other than the old Mission, were few and far between. With the exception of a very limited number of vine growers, none believed any grape could be as good as the Mission, and we have even at this date a Quixotic spirit existing in some parts of our State, still advocating the planting of this very poor, quality-lacking grape.

Experience has shown that it only produced an ordinary, coarse, heavy, flavorless white wine, taking an indefinite period to mature. Such questionable qualities as it may possess in the production of a white wine are more than overbalanced by the miserable red wine made from it. And to this cause, more than any other, I attribute the bad reputation our wines had earned, both here and in the Eastern States, previous to the more general planting of other and finer varieties of grapes.

Many claims have been made by the admirers of the Mission grape, but none have been proven. It bears unevenly, ripens unevenly, and takes upon itself almost every disease that comes along. In this respect we have to congratulate ourselves, for soon the phylloxera and the grafting knife will have rid us of its presence in our vineyards. In point of fact, most of our vineyards are now planted with vines more hardy, resisting disease better, more constant bearers, producing finer qualities and greater quantity than the Mission ever succeeded in doing under the most favorable conditions. Through the persistent efforts of a few enterprising viticulturists, small quantities of wine have been produced from the imported varieties, whose character was so distinctive and so strikingly showed superiority over those made from the Mission, that new faith in the future of California wines was born, and the belief spread that under proper conditions, our State might some day make wine of a superior grade, and eventually rival some of the better wines of European countries.

At the beginning of 1880, our viticultural interests were in a complete state of chaos. In spite of the efforts made by our wine makers and wine merchants, only a limited market had been secured for our wines in the Eastern States, and though the demand showed a steady annual increase, it was at the slowest of rates. Even that small increase, however, was considered gratifying, and hailed as encouraging.

The crop of the year 1879 had been a short one. The old stocks had been exhausted, and suddenly the price of all kinds of wine went up, and the supply was barely sufficient to meet the demand of the market.

This awakened the more general interest of the public in vine planting, but there was a woeful lack of knowledge, a want of system, no beaten paths to follow, and but a few acknowledged authorities to apply to for information. Numerous newspaper articles appeared calling attention to the value of viticulture in our State, and expressing the desire for the formation of some State institution, where such practical knowledge might be obtained as was necessary to the successful conduction of this important branch of agriculture.

Under these influences, soon after, the State Legislature took the matter under advisement, and in March, 1880, the State Board of Viticulture was created, and provided with a modest fund to meet its necessary expenditures.

The numerous duties falling to this Board are fully outlined in the Organic Act, then created and approved April 15, 1880, and enlarged in 1881, and which you will find in our First Annual Report, on pages 5, 6, 7, 8.

Under this Act the State was divided into seven viticultural districts, each having a representative in the Board, appointed by the Governor, and chosen from among men practically conversant with viticulture in its various branches, and recognized in their districts as suitable for the position.

Besides the Commissioners from these seven viticultural districts, there were to be appointed two extra Commissioners to represent the State at large, thus forming a Board consisting of nine Commissioners. The offi-

cers of the Board were to consist of a President, a Vice-President, a Secretary, and a Chief Executive Health Officer. No salary was allowed any of the Commissioners or officers, except the Chief Executive Officer and the Secretary, the rest of the Board serving without compensation.

It was understood that the Governor of the State having the appointment of these men, would choose those who were best adapted to fill the post of honor without regard to social position, creed, or politics, and though the terms of three Governors have ended, this understanding has been honorably maintained up to your administration.

The original appointments were made, and the several commissions signed by the Governor, April 19, 1880, and immediately upon receiving notice to that effect, the Commissioners assembled, organized the Board, and shortly afterward began their labors.

The following list comprises the officers and members of the original Board of State Viticultural Commissioners as above organized:

Arpad Haraszthy, President.....	Commissioner for the San Francisco District.
Chas. A. Wetmore, Vice-President.....	Commissioner for the State at Large.
Chas. Krug, Treasurer.....	Commissioner for the Napa District.
I. DeTurk.....	Commissioner for Sonoma District.
R. B. Blowers.....	Commissioner for Sacramento District.
George West.....	Commissioner for San Joaquin District.
L. J. Rose.....	Commissioner for Los Angeles District.
G. G. Blanchard.....	Commissioner for El Dorado District.
J. DeBarth Shorb.....	Commissioner for State at Large.
Dr. J. I. Bleasdale.....	Secretary.
Chas. A. Wetmore.....	Chief Executive Viticultural and Health Officer.

STANDING COMMITTEES.

Executive—Chas. A. Wetmore, Geo. West, and I. DeTurk.

Auditing—R. B. Blowers.

Finance—L. J. Rose, and J. DeBarth Shorb.

Phylloxera, Vine Pests, and Diseases of the Vine—I. DeTurk, Geo. West, Chas. Krug, R. B. Blowers, and Chas. A. Wetmore.

On Conference with Board of Regents of State University—Arpad Haraszthy, Chas. A. Wetmore, and Chas. Krug.

On Instruction for the office of the Chief Executive Viticultural Officer—Arpad Haraszthy, Chas. Krug, and I. DeTurk.

On Horticulture—Geo. West, R. B. Blowers, and J. DeBarth Shorb.

On Distillation, Counterfeits, and Adulterations—J. DeBarth Shorb, Chas. Krug, and Geo. West.

The following are the only changes that have taken place among the Commissioners and officers of the Board irrespective of the various committees:

In 1881 John H. Wheeler became Secretary, in the place of Dr. J. I. Bleasdale.

In February, 1885, Chas. A. Wetmore was appointed Commissioner for the San Francisco District, vice Arpad Haraszthy, resigned; and on the same date Arpad Haraszthy was appointed Commissioner for the State at large, vice Chas. A. Wetmore, resigned.

In 1887 Chas. A. Wetmore resigned the position of Chief Executive Viticultural Officer, and was succeeded by our Secretary, John H. Wheeler. Clarence J. Wetmore was then appointed to the place of Secretary.

Later on, in 1887, Dr. W. S. Manlove was appointed to the place formerly occupied by R. B. Blowers, representing the Sacramento Viticultural District.

The various committees as then appointed were calculated to cover all ordinary contingencies that might arise, and but few changes have since taken place among them.

There has been no change in the position of President, Vice-President, and Treasurer.

For a better understanding of the important labors undertaken and accomplished by our committees, I refer you to the first annual report of this Board, which you will find herewith transmitted, together with subsequent papers and reports, emanating from the Commission.

The more important labors for the year 1880, as published in the first annual report, were as follows:

First—Identification of the presence and habits of the phylloxera, and experiments made towards discovering a remedy to check its extension, and if possible resist its ravages and exterminate it. With this purpose in view, valuable translations were made from the French and other languages, containing instructions regarding the use of the various supposed phylloxera remedies.

Second—The securing and studying of the supposed phylloxera resisting vines.

Third—The grafting of the superior known varieties upon inferior varieties of vines.

Fourth—Raisin making in Spain, with full and most valuable details.

Fifth—The study of the wild vines of California, and their adaptability for making wine or producing roots to be grafted upon.

Sixth—The study of fertilizers suitable to vineyards.

Seventh—Practical instructions in the planting of new vineyards, and selecting of proper varieties of grapes for table use.

Eighth—Raisin curing, wine making, brandy distillation: I can say with some pride that the work of the year proved to be of the utmost benefit to all classes of vine growers.

The demand was so great among the public for the report of the year, that the complete edition of about three thousand volumes was almost immediately exhausted, and a second edition had to be printed to meet the demand.

The work of this Commission and the method with which it was carried on, was so well appreciated by the succeeding Legislature, that it created a State Board of Horticultural Commissioners, under similar laws as those of this Board, and put the same under the direction of the Viticultural Commission to take charge of, together with the funds appropriated for its maintenance.

This Horticultural Commission was supervised by our Board during the term of two years, and the result of their supervision proved itself satisfactory both to the horticulturists and the public at large. Owing, however, to the additional work thus thrown upon this Board, it appealed to the Legislature to relieve them of the charge and allow the horticulturists to conduct their own Board as they might think best. This was acceded to at the following term of the Legislature.

For the year 1881, I refer you to the printed report, also herewith transmitted, consisting of the reports made by the several Commissioners, together with a report of the Chief Executive Officer.

The latter's report consists mainly of experimental field work, grafting, fertilizing, and observations made on the habits of the phylloxera. Following these papers, come a number of valuable translations made from recognized French authorities, and consist of experiments on submersion and planting the vines in sand as protection against the phylloxera. Various methods of pruning and cultivation of the vine. Characteristics of the principal species of wild vines, studies and observations on the wild vines of America, instruction in the handling of insecticides dangerous to the vine, and reports on the results of the same. Following these comes the

second annual report of the committee on phylloxera, vine pests, and diseases of the vine.

Owing to the demands of an appreciative public, both editions of the above volumes are now completely exhausted.

The third annual report of the Commission is contained in the Second Annual Report of the Chief Executive Viticultural Officer, and covers the years 1882, 1883, and 1884. This volume you will also find in the collection sent you. In this report will be found information of the most valuable kind regarding the developments of our viticultural industry, and the culture of the vine in California. A speculative essay on the varieties of grapes possibly adaptable to our climate and soil. General principles governing the vegetation, pruning, training, and cultivation of the vine, to which are joined elaborate illustrations, showing methods of the different operations. Then follows the ampelography of California. Diseases and pests of the vine, miscellaneous topics, translations, treating of the culture of the vine *en chaintres*, with illustrations, translations showing the culture of the vine in the Gironde; and finally, translations describing and illustrating the various methods of grafting.

This volume is one of the most useful practical viticultural books that has ever been printed in the English language.

In the year 1882 the Commission inaugurated the first Viticultural Convention, and this proved to be the most effective method of gathering and disseminating just such knowledge as was required by the neophyte in vine planting, raisin curing, and wine making.

Many valuable papers were read at the Convention, and a large number of wine samples, raisins, wine and table grapes were exhibited and reported upon by duly appointed and thoroughly competent committees. The result proved itself of the most satisfactory nature, but owing to a lack of funds in the State Printing Office, the proceedings of that Convention were only published through the enterprise of the owners of the "San Francisco Merchant," and through that medium became distributed throughout the State.

In the following year a District Viticultural Convention was held at Los Angeles, which resulted in producing a marked improvement in the manufacture of wines in that district, through the introduction of varieties of grapes hitherto almost unknown in that section.

During the same year the Second Annual Viticultural State Convention was held in this city, under an increased interest among the public and the vine growers generally. Papers of value were read, discussions entered into, grapes, raisins, wine, and brandies were exhibited, submitted to competent committees, and faithfully reported upon.

Again, owing to a lack of funds in the State Printer's Department, the proceedings of that Convention had to be turned over to private enterprise, and the "San Francisco Merchant" took charge of the same, publishing the proceedings in its columns.

In the year 1884 a District Viticultural Convention was held in Fresno, and raisin curing was given the post of honor. Then came irrigation, drainage, proper varieties of grapes, insecticides, and the making and storage of wine in hot climates. A marked interest was shown in the topics under consideration, and much practical knowledge acquired. The proceedings were again published in the "San Francisco Merchant," for reasons already mentioned.

In the same year the Third Annual Viticultural Convention was held in this city, similar in tenor to those previously held; and you will find joined herewith a full report of that Convention, which was also printed in the "San Francisco Merchant," for want of an adequate appropriation

in the State Printer's office. At that Convention about four hundred samples of wines and brandy were exhibited, coming from nearly every wine district in the State, besides many samples of raisins and table grapes.

The Fourth State Viticultural Convention was also held in this city, and likewise published in the "San Francisco Merchant," for want of funds.

In 1886, our funds having been exhausted in our endeavor to pass a National Pure Wine Bill, the conduction of our Convention was turned over to the Grape Growers and Wine Makers' Association, and held in this city under their auspices, in March, 1887. A copy of the proceedings you will find transmitted with this report.

The Sixth Annual Convention was held in the beginning of March of this year, and, if possible, proved itself even more popular and more satisfactory than any of its predecessors, there being a larger attendance and a larger number of wine and brandy samples exhibited, thus clearly proving the recognized value of these Conventions, and their growing appreciation by the vine growers at large; and I may here state I know of nothing so conducive towards the rapid improvement in quality of our viticultural productions as the holding of such Conventions, the reading of papers from practical and experienced men, and a considerate discussion of the merits of the subjects presented. At all Conventions more or less machinery and viticultural implements have been exhibited, and closer attention drawn to the value of numerous new methods and new appliances for the pressing of wine, the crushing of grapes, the grafting of vines, the tilling of the soil, and devices for perfecting the packing of raisins.

Reports of the various committees on wines tasted during the last Convention, were unanimous in the acknowledgment of their marked improvement in quality over those of previous years, attributing the improvement not only to the better management in the fermentation of the wines, but likewise to the greater knowledge attained in the selection of proper varieties of grapes for certain localities, planted with due regard to exposure, soil, and climate.

To further demonstrate the extent of the work accomplished by the Commission, I herewith add a hurriedly collected index of original papers, written on various viticultural subjects, by the officers and members of this Board, as well as those written by others, at the solicitation of the Commission, and have indicated where these papers were printed and can be found. It is with a sense of pride that I point to these practical papers on the various branches of viticulture, and invite any other wine country to show a single one of its institutions that has accomplished more in the same period of time.

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PROGRAMME OF SIXTH ANNUAL VITICULTURAL CONVENTION, MARCH 7, 8, 9, AND 10, 1888.

The following list of speakers read original papers in the order mentioned:

- Arpad Haraszthy, President of the Board of State Viticultural Commissioners: Opening Address (Annual)—"Past, Present, and Future of our Viticultural Industries."
- T. C. White, Fresno: "Raisins—Drying, Packing, and Preparing for Market."
- Dr. W. S. Manlove, Viticultural Commissioner for the Sacramento District: "Table Grapes."
- R. J. Harrison, San Francisco: "Wine Storage and the Preserving of Fruits in Cold Storage."
- Leonard Coats, Napa: "Best and Cheapest Methods of Obtaining a Grafted Vineyard on Resistant Stocks."
- C. J. Wetmore, Secretary of the Board of Viticultural Commissioners: "The Chaintre System of Pruning and Conducting the Vine in California."
- H. W. McIntyre, President of the Vine Growers and Wine Makers' Association: "Distillation of Grape Brandy—How to Establish and Conduct a Distillery."
- Frank West, Stockton: "Wine Cellars for the Interior Valleys."
- Dr. John A. Stewart, Santa Cruz: "Maturing Wines."
- H. A. Merriam, Los Gatos: "Wine and Brandy Making as a Profession."
- Professor W. B. Rising, State Analyst and Professor of Chemistry at University of California: "Sophistication of Wines."
- E. H. Rixford, Secretary of the Vine Growers and Wine Makers' Association: "Sherry Flavor in Wines."
- J. H. Wheeler, Chief Executive Viticultural Officer: "Some Pests and Diseases of the Vine, with Remedies."
- J. L. Heald, Crockett, Contra Costa County: "Wine-Making Machinery."
- H. A. Pellet, St. Helena: "Fermentation."
- J. P. Smith, Livermore: "Our Markets for Wine."
- F. T. Eisen, Fresno: "How to Conduct Fermentation in Fresno County."
- Professor E. W. Hilgard, Professor of Agriculture at University of California: "Results of Experimental Fermentations made in 1887."
- Charles A. Wetmore, Vice-President Board of State Viticultural Commissioners: "Practical Temperance Reform."
- Arpad Haraszthy, President of the Board of State Viticultural Commissioners: "How to Drink Wine."
- F. Pohndorff, Mission San José: "Wine as a Temperance Agent."

The above list or index is far from complete of the work accomplished or inaugurated by the Commission—many valuable papers having appeared in the daily newspapers, that my limited time will not permit of finding.

At the time of the organization of the Viticultural Commission it was estimated that there were thirty-five thousand acres of vines planted in the State. I am inclined to accept these figures as correct. Of this amount there may have been planted as much as 20 per cent with imported varieties, and the balance with Mission grapes.

At the present date, after eight years existence of the Viticultural Commission, it is believed that there are planted not less than one hundred and fifty thousand acres in vines, and fully 90 per cent of these are reckoned as consisting of the finer grades of foreign wine grape varieties, mainly drawn from France, Spain, Portugal, Italy, Germany, and Hungary. The result of the planting of these fine grade grapevines, has been the producing of wines of much better quality than had been hitherto produced, creating a revolution in favor of California wines and the conquest of markets that even the most sanguine among us never hoped to acquire.

From the very beginning the Commission, recognizing the value of correct statistics, endeavored to collect such as might show the true condition of the viticulture of our State, and, with this purpose in view, circulars

were sent out to all parts of the State, asking for detailed information on the number of vines planted in each district and locality; the age and varieties of vines planted; the number, names, and post office addresses of the various vine growers of the different districts, and other matters of public interest and value.

Though this work was entered upon with zeal and prosecuted vigorously, it met with only a partial success, owing to the many unreliable statements received from some quarters, and the general unwillingness to give any such information, by those interested. In spite of these difficulties, however, the Commission has finally been able to secure the names and addresses of about six thousand viticulturists.

The same work had been attempted by a number of people interested in vine growing, and quite recently again by the San Francisco Wine Dealers' Association, but each effort proved abortive. Nevertheless very close estimates have been made, or at least estimates that are accepted as close, and with these in mind we can consider some of the points bearing on the present and possibly the future of this industry in our State. And, at the same time, we can note the actual progress made in the sale of our wines at home and abroad, together with the prices ruling and total estimated values.

To begin, I will assume that there are now planted in California one hundred and fifty thousand acres of vines, which will all be in full bearing within three years hence. Allowing these an average value of \$300 per acre, without other improvements, we will have a valuation of \$45,000,000. Of course, there are vineyards not worth \$2 per acre, but these are few in number, and either planted with the Mission, or some other equally common varieties of grapes. On the other hand, many of our vineyards are worth considerably more than \$300 per acre, which difference would more than balance the discrepancy of the above estimates. I reckon the value of the improvements necessary to carry on the vineyard business successfully at \$20,000,000. These improvements consist of fences, houses, barns, cellars, presses, tanks, casks, distilleries, agricultural implements and machinery, live stock, etc. The two estimates thus made would place the present capital invested in viticulture in California at \$65,000,000. Comparing the present valuation with that existing previous to the creation of the State Board of Viticulture, we are confronted with the following interesting results: Thirty-five thousand acres in vines, of which 80 per cent were Mission grapes, at \$300 per acre, gives \$10,500,000; proportionate other improvements necessary to carry on the vineyards, etc., \$4,000,000; total investment, \$14,500,000.

This shows a direct increase of \$50,500,000 in the viticultural investments within the last eight years, and of course yielding a proportionate greater income by taxation to the State through the enhanced value of vineyard and contiguous lands. And we might smilingly say to the State of California that it has reaped, and will continue to reap, a very handsome income from the paltry sums given to support this Board of Viticulture. We may doubt whether any private investment has ever secured such golden returns, always, of course, excepting the railroads and other transportation companies.

Within the past few years, owing to many contingencies, the production of our vineyards have not kept pace with the number of vines planted in point of quantity. These differences are caused sometimes by fall or spring frosts, or by both; sometimes by strong winds sweeping over the vineyards while the vines are in bloom; then by sunburn, and other times by the visitation of peronospera, or kindred fungoid diseases. Even the grasshopper has had his sway, and with him various other bugs, worms, and moths.

Bearing in mind the rapid increase in acreage of vines from year to year, since 1877, we will be somewhat surprised to note the differences in the amounts of wine produced as shown by the following figures:

Vintage.	Gallons New Wine.
1877	4,000,000
1878	5,000,000
1879	7,000,000
1880	10,200,000
1881	8,000,000
1882	9,000,000
1883	8,500,000
1884	10,000,000
1885	11,000,000
1886	18,000,000
1887	15,000,000

From the number of vines coming into bearing we should have produced not less than twenty million gallons in 1886, and twenty-five million gallons in 1887. In alluding to the above estimates as wine, I desire it understood that they are reckoned at the first racking of the newly fermented juice only. When the wine will have become one year old, and fit for removal by the trade, the above quantities will have very greatly diminished through natural shrinkage and accidental losses. Much of it will have spoiled, and only fit to be used for making vinegar or brandy.

Considerable quantities of wine are annually made in this city by the Italian, French, Spanish, and Portuguese population, and either consumed in their own households, or sold in a small way to their neighbors and friends. Large quantities of grapes shipped to San Francisco are thus done away with, and, at the beginning of the season, usually realize quite good prices.

It is difficult to form a close estimate of the wine yearly consumed on this coast. I am led to believe that not less than two million gallons are used in San Francisco and Oakland, and about three million gallons more in the interior of the State, in Arizona, Oregon, Washington Territory, Nevada, and Utah. The amount exported to the Eastern States and foreign countries in 1887, reached seven million gallons more, giving a total demand for the year of twelve million gallons.

Reckoning in the sweet together with the dry wines, this would give an approximate value of \$4,500,000, and the brandy used on this coast, if exported, would swell the amount about \$1,000,000 more, giving a consumption equal to \$5,500,000.

And right here it may be well to draw your attention to the possible value of the productions of our vineyards within the next three years. Assuming that our one hundred and fifty thousand acres will be in full bearing at the end of that time, that fifteen thousand acres of these are planted for raisins, and ten thousand for raising table grapes, we have left one hundred and twenty-five thousand acres for wine and brandy making. These figures will yield us a possible one and a half million boxes of raisins; forty thousand tons of table grapes for export and home consumption; fifty million gallons of wine, and one and a half million gallons of brandy. I value these as follows; new and in producer's hands:

1,500,000 boxes raisins at \$2	\$3,000,000
40,000 tons table grapes at \$30	1,200,000
50,000,000 gallons wine at 20 cents	10,000,000
1,500,000 gallons tax paid brandy at \$1 40	2,100,000
Total	\$16,300,000

It seems to me, as it must likewise seem to you, that the State is doing well to foster an enterprise that can bring such returns, the more so since the greater part of these productions will be sold abroad, and in return bring its harvest of gold to enrich our citizens, encourage labor, and create prosperity.

The prices paid for wines during the past year ranged most discouragingly low. There seemed to be a regular stampede among producers, and a corresponding fear among the merchants, that the prospective vintage of 1887 would turn out enormously large.

This presumption, however, not being realized, prices have taken an upward road, and while wines of 1886 could have readily been bought at from 13 to 14 cents per gallon in August last, all such stock has been exhausted, and the new wines of 1887 now readily command from 17 to 20 cents for the ordinary qualities, and notably higher for the finer grades.

The following are the average prices paid per ton, during the vintage of 1887, for the more prominent varieties of wine grapes:

Cabernet.....	\$25 to \$30
Petit Pinot	25 to 30
Black Burgundy.....	18 to 20
Meunier	18 to 20
Riesling	18 to 20
Mataro	16 to 18
Zinfandel	14 to 16
Carbone	13 to 15
Malvoise.....	8 to 9
Mission.....	7 to 8

It is of course understood that these prices varied in different localities, conforming to the universal rule of supply and demand. It is a matter of fact as well as one for congratulation, that the reputation of our wines is favorably increasing, both among ourselves and among the wine drinkers in other countries. This is owing chiefly to the laudable ambition of our wine makers not only to increase their knowledge in the modes of fermentation, but also to their persistent efforts to secure better quality, through the planting of vines better adapted to their locality, and selecting the finer varieties of grapes even at the expense of quantity. To continue in that direction will, in the near future, find us markets for any surplus we may have, in Asia, South America, and even in Europe; and were the Americans but wine drinkers at home, as they ought to be for their own good and the cause of true temperance, there would soon be no surplus at all.

Our increasing shipments of both wine and brandy out of the State, by rail and sea, are shown to considerable advantage by the following statistical tables that I have compiled from the most authentic sources, and, after verification, arranged to give a clear, comprehensive insight to the importance of this branch of trade.

Receipts of California Wine and Brandy at San Francisco from the Interior.

YEARS.	Wine, Gallons.	Brandy, Gallons.
1875	1,995,629	52,036
1876	1,697,590	60,527
1877	2,336,653	126,324
1878	2,933,136	103,772
1879	3,364,607	93,506
1880	3,759,743	133,764
1881	4,937,876	157,083
1882	4,452,386	136,883
1883	4,838,623	131,711
1884	4,858,458	112,265
1885	5,895,100	157,752
1886	6,209,131	180,324
1887	8,496,344	256,104
Total	55,825,276	1,702,051

The increase from 1875 to 1887 was 425 per cent for wine, and 492 per cent for brandy.

The noticeable fluctuations in the amounts of brandy received, were caused by the greater or less price that wine could command, quite as much as to the scantiness or abundance of the vintage.

Total Wine Shipments out of the State, with Declared Values and Computed Average Value per Gallon.

YEARS.	By Sea, Gallons.	By Rail, Gallons.	Total Gallons.	Total Values.	Average Price, Cents.
1875	507,809	523,698	1,031,507	\$629,219	.61
1876	516,269	598,776	1,115,045	691,327	.62
1877	896,346	566,446	1,462,792	833,791	.57
1878	1,238,626	573,533	1,812,159	987,626	.542
1879	1,399,094	756,850	2,155,944	1,174,989	.542
1880	1,545,715	941,638	2,487,353	1,343,170	.54
1881	1,505,262	1,340,103	2,845,365	1,564,950	.55
1882	1,365,177	1,451,558	2,816,735	1,718,208	.61
1883	1,290,373	1,899,794	3,190,167	1,738,640	.542
1884	1,210,455	2,313,644	3,524,099	2,008,736	.57
1885	1,196,297	3,059,927	4,256,224	2,234,517	.522
1886	763,999	4,428,224	5,192,223	2,959,567	.57
1887	1,958,032	4,943,739	6,901,771	3,140,305	.452
Total	15,393,454	23,397,930	38,791,384	\$21,025,045	

I draw your attention to the fact that the *declared* value is not always the true value; had the time permitted, I should have preferred making out the values in accordance with the average ruling prices of the different years. It is fortunate, however, that the above estimates are not very much out of the way, considering that they cover a very large amount of sweet or fortified wines, such as port, sherry, angelica, etc., and besides that large quantities of old and costly wines. You will also note the steady unceasing gain of the rail transportation over that of the sea without a single interruption from 1875 to 1887. This is caused on the one hand by the increased consumption in the eastern inland centers, and on the other, by an active and beneficial competition in the rates of freight between rail, steamer, sailing vessel, and a consideration of the important factors, time, interest, and insurance. With quick and certain delivery, the eastern merchant can do the largest amount of business with the lesser amount of invested

capital. It is the consideration of this fact that has caused most of our larger city and country wine merchants to establish branch houses in the most important eastern centers of trade. They are thus enabled to make quick and satisfactory deliveries.

Total Brandy Exports out of the State, with Declared Values and Computed Average Value per Gallon.

YEARS.	By Sea, Gallons.	By Rail, Gallons.	Total Gallons.	Total Value.	Average Price.
1875 -----	39,924	2,394	42,318	\$89,714	\$2 12
1876 -----	36,901	23,092	59,993	120,585	2 01
1877 -----	64,940	74,952	139,892	259,915	1 87
1878 -----	91,324	37,875	129,199	248,062	1 92
1879 -----	95,504	68,388	163,892	319,627	1 96
1880 -----	97,533	91,565	189,098	378,196	2 00
1881 -----	60,093	149,584	209,677	461,289	2 20
1882 -----	44,752	169,410	214,162	473,298	2 21
1883 -----	35,194	196,109	231,303	501,927	2 17
1884 -----	18,969	202,934	221,903	501,500	2 26
1885 -----	13,712	250,128	263,840	554,064	2 10
1886 -----	22,430	238,335	260,765	518,922	1 99
1887 -----	60,572	412,180	472,752	774,313	1 64
Totals -----	681,848	1,916,946	2,598,794	\$5,201,412	

The above table includes all shipments to foreign countries, and were such amounts considerable the average quoted would be overestimates, for there is no brandy shipped to foreign ports that is not shipped in bond, and thus free of the internal revenue tax of 90 cents per proof gallon. The only exception to this rule is such brandy as is shipped in cases; these are not within the bonding privilege, and it is a very great drawback to the brandy trade of our State that such privilege is not conceded by the Federal Government. Were we permitted to bottle our brandies in bond an enormous trade would spring up in foreign countries, especially those of Central and South America, Mexico, the Sandwich Islands, China, and Japan. These countries could thus also secure our brandies in their absolute purity, and would not be slow in their appreciation of that fact and make the most of it, both for ordinary as well as medicinal use. In the matter of transportation, the rail shows the most extraordinary increase over that of the sea; and if continued, as it must, it would take the entire brandy carrying away from the sea were it not for the slowly increasing trade of Mexico, the Islands, and Central America, as will be hereafter shown. It is by far more satisfactory, both to consignor as well as consignee, to have transportation of brandy made by rail rather than by sea, for reasons already mentioned for wine.

Sea Exports of California Wines, by Countries, to Foreign Ports, during 1875.

	Gallons.	Cases.	Value.
Central America	430		\$279 00
British Columbia	405	118	719 00
Mexico	11,741	444	8,938 00
Honolulu	358	103	681 00
Europe	3,191	360	2,733 00
Panama and South America	363	84	520 00
Japan	70	168	672 00
China	48	37	178 00
Other countries	5,915	1,081	7,932 00
Totals	22,461	2,395	\$22,652 00

During 1876.

	Gallons.	Cases.	Value.
Central America	173		\$102 00
British Columbia	986	184	1,347 00
Mexico	6,312	638	6,465 00
Honolulu	1,289	70	1,252 00
Europe	4,803	185	4,102 00
Panama and South America		138	552 00
Japan	69	199	796 00
China	32	35	170 00
Other countries	6,894	776	7,078 00
Totals	20,558	2,225	\$21,864 00

During 1877.

	Gallons.	Cases.	Value.
Central America	12,250	1,449	\$11,105 00
British Columbia	306	23	423 00
Mexico	10,997	571	9,473 00
Honolulu	1,996	73	1,816 00
Europe	12,960	312	9,504 00
Japan	10	227	1,119 00
China	35	16	85 00
Panama and South America	328	107	577 00
Other countries	4,163	102	3,764 00
Totals	43,045	2,880	\$37,866 00

During 1878.

	Gallons.	Cases.	Value.
Central America	5,941	2,028	\$13,264 00
British Columbia	1,080	203	1,578 00
Mexico	8,825	422	6,989 00
Honolulu	439	73	737 00
Europe	2,990	73	2,985 00
Japan	202	186	937 00
China	80	51	447 00
Panama and South America	940	131	982 00
Other countries	7,812	246	5,898 00
Totals	28,309	3,413	\$33,817 00

During 1879.

	Gallons.	Cases.	Value.
Central America	5,740	2,297	\$8,991 00
British Columbia	111	30	322 00
Mexico	9,199	453	7,583 00
Honolulu	2,050	44	1,614 00
Europe	3,326	125	3,483 00
Japan	3,415	583	4,766 00
China	25	34	214 00
Panama and South America	138	142	655 00
Other countries	5,295	295	4,630 00
Totals	29,299	4,003	\$32,258 00

During 1880.

	Gallons.	Cases.	Value.
Central America	13,580	2,514	\$17,874 00
British Columbia	1,368	23	902 00
Mexico	18,219	834	14,292 00
Honolulu	1,431	306	1,915 00
Europe	96,681	174	66,916 00
Japan	207	75	489 00
China	61	61	452 00
Panama and South America	765	157	1,226 00
Other countries	10,133	271	11,565 00
Totals	142,445	4,415	\$115,631 00

During 1881.

	Gallons.	Cases.	Value.
Central America	14,165	2,829	\$23,704 00
British Columbia	1,530	40	1,352 00
Mexico	16,486	631	12,990 00
Honolulu	911	153	1,748 00
Europe	1,045	18	925 00
Japan	832	59	833 00
China	727	97	1,240 00
Panama and South America	3,984	171	2,582 00
Other countries	4,126	227	4,266 00
Totals	43,806	4,225	\$49,640 00

During 1882.

	Gallons.	Cases.	Value.
Central America	10,045	1,324	\$13,645 00
British Columbia	1,770	31	1,277 00
Mexico	18,107	1,134	18,004 00
Honolulu	695	287	2,165 00
Europe	2,018	73	2,280 00
Japan	624	91	834 00
China	497	107	1,318 00
Panama and South America	3,117	159	2,223 00
Other countries	9,318	451	9,999 00
Totals	46,191	3,657	\$51,745 00

During 1883.

	Gallons.	Cases.	Value.
Central America	9,683	1,629	\$18,081 00
British Columbia	3,620	67	3,238 00
Mexico	24,294	903	20,856 00
Honolulu	2,392	433	3,474 00
Europe	5,220	164	3,901 00
Japan	1,095	74	1,479 00
China	1,740	141	2,173 00
Panama and South America	5,474	191	2,615 00
Other countries	11,430	303	7,446 00
Totals	64,948	3,905	\$63,263 00

During 1884.

	Gallons.	Cases.	Value.
Central America	9,439	1,415	\$14,298 00
British Columbia	3,549	165	3,884 00
Mexico	14,467	761	15,929 00
Honolulu	2,762	1,567	8,510 00
Europe	5,969	209	6,009 00
Japan	1,940	192	2,359 00
China	1,244	62	1,080 00
Panama and South America	587	348	2,659 00
Other countries	8,053	155	6,916 00
Totals	48,010	4,874	\$61,644 00

During 1885.

	Gallons.	Cases.	Value.
Central America	16,404	2,194	\$24,700 00
British Columbia	5,975	179	6,472 00
Mexico	19,761	751	19,242 00
Honolulu	8,737	2,502	14,173 00
Europe	7,234	218	5,889 00
Japan	3,332	260	3,657 00
China	1,400	126	1,649 00
Panama and South America	2,768	130	2,057 00
Other countries	11,850	192	8,797 00
Totals	77,461	6,552	\$86,636 00

During 1886.

	Gallons.	Cases.	Value.
Central America	19,099	2,099	\$24,625 00
British Columbia	10,249	80	9,291 00
Mexico	24,330	401	16,965 00
Honolulu	41,096	1,520	44,565 00
Europe	3,768	314	3,192 00
Japan	10,124	204	4,570 00
China	668	673	2,242 00
Panama and South America	18,345	63	13,500 00
Other countries	11,397	289	6,459 00
Totals	139,076	5,643	\$125,409 00

During 1887.

	Gallons.	Cases.	Value.
Central America	31,260	2,534	\$34,654 00
British Columbia	13,313	215	9,717 00
Mexico	30,391	290	20,023 00
Honolulu	71,150	612	62,877 00
Europe	26,355	1,642	20,562 00
Japan	28,375	526	16,401 00
China	2,151	302	2,442 00
Panama and South America	26,449	67	11,151 00
Other countries	28,804	300	15,545 00
Totals	258,248	6,488	\$193,372 00

Resume of Sea Exports of California Wine by Countries to all Foreign Parts, from San Francisco, from 1875 to 1887, inclusive.

	Gallons.	Cases.	Value.
To Central America	148,209	22,312	\$205,322 00
To British Columbia	44,262	1,358	40,522 00
To Mexico	213,129	8,233	177,749 00
To Honolulu	135,306	7,743	145,527 00
To Europe	175,560	3,867	132,481 00
To Panama and South America	63,193	1,888	41,299 00
To Japan	50,295	2,844	38,912 00
To China	8,708	1,742	13,690 00
To other countries	125,190	4,688	100,295 00
Total foreign export	963,857	54,675	\$895,797 00

Total Yearly Sea Exports of California Wine to Foreign Countries, from San Francisco, from 1875 to 1887, inclusive.

YEARS.	Gallons.	Cases.	Value.
1875	22,461	2,395	\$22,652 00
1876	20,558	2,225	21,864 00
1877	43,045	2,880	37,866 00
1878	28,309	3,413	33,817 00
1879	29,299	4,003	32,258 00
1880	142,445	4,415	115,631 00
1881	43,806	4,225	49,640 00
1882	46,191	3,657	51,745 00
1883	64,948	3,905	63,263 00
1884	48,010	4,874	61,644 00
1885	77,461	6,552	86,636 00
1886	139,076	5,643	125,409 00
1887	258,248	6,488	193,372 00
Totals	963,857	54,675	\$895,797 00

The above tables show Mexico to have awakened to an appreciation of our wines earlier than any other foreign country, and to have continued that appreciation in a growing manner from year to year with but slight interruptions up to date. In 1886, however, she was outstripped by the Sandwich Islands by almost double, and in 1887 by more than double. Here we allude to wine in bulk only and not in cases or glass. Central America began recognizing the value of our wines in 1877, and, for local reasons, entered orders for notable quantities of cased wines, and continued

such orders up to date, in a uniformly satisfactory manner; at the same time running the demands for bulk wine close on to those of Mexico, and finally in the last year outstripping her neighbor by one thousand gallons. Japan, beginning with seventy-four cases and a modest one thousand gallons in 1883, has increased each year till in the last year twenty-eight thousand gallons and five hundred and twenty-six cases.

The Japanese must be acknowledged as decidedly a progressive people.

China, of all the countries, makes the poorest showing, though even that Celestial Empire has shown a slow-going increase.

British Columbia began awakening in this respect in 1880, and gradually increased her imports of our wines, until, in 1886, her demands reached ten thousand gallons, and in 1887 reached thirteen thousand.

The European countries have done very poorly with us, but that market recalls the carrying of coal to Newcastle. Spasmodic efforts have been made from time to time to place our wines in Europe, but up to this day with indifferent success, and yet her last year's taking, without forcing, of twenty-six thousand gallons and sixteen hundred cases of our wine, is somewhat encouraging, and it is my belief that if our wines go on increasing in quality, without too great an increase in price, that we will have an excellent market in certain European countries within a very few years. I allude to England, Scotland, Ireland, Belgium, Holland, and the north of Germany. In 1880, the bark *Stella* was laden with about ninety-five thousand gallons of our wine, and consigned on a venture to Germany. The venture brought our merchants a great deal, but was very disastrous in a financial point. The red wines she took were pronounced of the poorest quality (they were almost exclusively made from the Mission grape), but some of the white wines found some favor, as did the sweet white wines and the brandy, but all were pronounced entirely too high in price for the comparatively quality. In the following year, 1881, only one thousand gallons were shipped to Europe, and eighteen cases. However, the *Stella* venture created quite a commotion, and has since kept up a lively European interest in the progress of Californian viticulture, as shown by the gradually increasing figures.

Panama and South America, which showed an unreasonable advance and decline from 1875 to 1885, when they took about three thousand gallons, suddenly took eighteen thousand in 1886, and further increased their demand to twenty-six thousand cases in 1887. This must be attributed entirely to the building of the Panama Canal, and it should be exceedingly gratifying to us to see our wines meet those of France on neutral ground, and hold their own in quality as well as in price.

In the matter of totals from 1875 to 1887, inclusive, Central America bears the palm, and gives us the most satisfactory results, both in gallons of wine, numbers of cased wines, and in dollars and cents. Mexico follows next; Europe follows in gallons of wine, but falls considerably behind the Sandwich Islands in monetary value. In fact, the rank belongs to the Sandwich Islands, for the excess in gallons in favor of Europe was a chance won through the *Stella* episode, while the demand for Hawaii was a constant and legitimate demand. Then in rank follow Panama and South America. British Columbia ranks Japan slightly in value, but exceeds in gallons and numbers of cased wines. Thus showing a better quality of wine shipped to our English colonial neighbor.

Glancing at the table showing the yearly total exports to foreign countries, we must confess a gradual favorable increase, with three exceptions, from 1875 down to present date, in gallons, as well as in dollars and cents, and numbers of cases. If we consider all the efforts made, the result

might be considered trifling, but we must not lose sight of the fact that our greatest exports were made within the last two years, the latter one notably greater than its predecessor, thus showing a foothold gained, an advance made. In looking over the above tables, I look with the greatest interest upon the number of cases of wine exported to the various countries, and deem that country the most valuable to us that requires the greatest amount of cased wine. In the trade cased wines are always considered of better quality, more mature, and consequently commanding a better price than wines shipped in bulk. Besides that, being labeled and packed by local firms with their own labels and brands, they carry with them the reputation of our State, and herald whatever quality they may possess to any country and every clime which they may reach. Thus our good wines can proclaim themselves throughout the world, and increase both good name and trade. More than this, the handling and bottling of our wines is not always successful with those unaccustomed to their peculiarities, and thus our wines are often spoiled through ignorant management, and our representation thereby made to suffer. Furthermore, by casing and labeling our wines with our own labels, they can not be conveniently palmed off as foreign wines upon the confiding consumer. And lastly, the bottling, casing, and handling, gives work to so many more of our working men in wineries, box manufactories, nail factories, paper mills, glass works, printing, and numerous other local industries, all of which develop the resources of our State, and increase its prosperity.

While the above tables show the comparative sea exports of our wines to each country, for each year, the tables here following will show the drift, and such fluctuations as have occurred from year to year in our sea exports to each country in the past thirteen years. This arrangement shows at a glance the yearly progress of the trade with the different countries, and must prove of some interest to the vine grower, as well as to the merchants and transportation companies, and it is for that reason I have compiled them, and endeavored to rescue them from total oblivion.

CALIFORNIA WINE EXPORTS BY SEA TO NEW YORK AND FOREIGN COUNTRIES FROM SAN FRANCISCO, FROM 1875 TO 1887, INCLUSIVE.

To New York.

YEARS.	Gallons.	Cases.	Value.
1875	464,706	74	\$283,766 00
1876	493,459	841	299,318 00
1877	844,301	729	480,141 00
1878	1,200,471	864	642,301 00
1879	1,359,470	220	723,186 00
1880	1,373,730	318	725,373 00
1881	1,450,514	172	777,946 00
1882	1,408,316	571	780,394 00
1883	1,214,755	363	638,571 00
1884	1,149,579	269	626,132 00
1885	1,102,081	150	542,643 00
1886	610,366	180	289,792 00
1887	1,680,227	1,335	696,412 00
Totals	14,351,975	6,086	\$7,505,975 00

To Central America.

YEARS.	Gallons.	Cases.	Value.
1875 -----	430	-----	\$279 00
1876 -----	173	-----	102 00
1877 -----	12,250	1,449	11,105 00
1878 -----	5,941	2,028	13,264 00
1879 -----	5,740	2,297	8,991 00
1880 -----	13,580	2,514	17,874 00
1881 -----	14,165	2,829	23,704 00
1882 -----	10,045	1,324	13,645 00
1883 -----	9,683	1,629	18,081 00
1884 -----	9,439	1,415	14,298 00
1885 -----	16,404	2,194	24,700 00
1886 -----	19,099	2,099	24,625 00
1887 -----	31,260	2,534	34,654 00
Totals -----	148,209	22,312	\$205,322 00

To British Columbia.

YEARS.	Gallons.	Cases.	Value.
1875 -----	405	118	\$719 00
1876 -----	986	184	1,347 00
1877 -----	306	23	423 00
1878 -----	1,080	203	1,578 00
1879 -----	111	30	322 00
1880 -----	1,368	23	902 00
1881 -----	1,530	40	1,352 00
1882 -----	1,770	31	1,277 00
1883 -----	3,620	67	3,238 00
1884 -----	3,549	165	3,884 00
1885 -----	5,975	179	6,472 00
1886 -----	10,249	80	9,291 00
1887 -----	13,313	215	9,717 00
Totals -----	44,262	1,358	\$40,522 00

To Mexico.

YEARS.	Gallons.	Cases.	Value.
1875 -----	11,741	444	\$8,938 00
1876 -----	6,312	638	6,465 00
1877 -----	10,997	571	9,473 00
1878 -----	8,825	422	6,989 00
1879 -----	9,199	453	7,583 00
1880 -----	18,219	834	14,292 00
1881 -----	16,486	631	12,990 00
1882 -----	18,107	1,134	18,004 00
1883 -----	24,294	903	20,856 00
1884 -----	14,467	761	15,929 00
1885 -----	19,761	751	19,242 00
1886 -----	24,330	401	16,965 00
1887 -----	30,391	290	20,023 00
Totals -----	213,129	8,233	\$177,749 00

To Honolulu.

YEARS.	Gallons.	Cases.	Value.
1875	358	103	\$681 00
1876	1,289	70	1,252 00
1877	1,996	73	1,816 00
1878	439	73	737 00
1879	2,050	44	1,614 00
1880	1,431	306	1,915 00
1881	911	153	1,748 00
1882	695	287	2,165 00
1883	2,392	433	3,474 00
1884	2,762	1,567	8,510 00
1885	8,737	2,502	14,173 00
1886	41,096	1,520	44,565 00
1887	71,150	612	62,877 00
Totals	135,306	7,743	\$145,527 00

To Europe.

YEARS.	Gallons.	Cases.	Value.
1875	3,191	360	\$2,733 00
1876	4,803	185	4,102 00
1877	12,960	312	9,504 00
1878	2,990	73	2,985 00
1879	3,326	125	3,483 00
1880	96,681	174	66,916 00
1881	1,045	18	925 00
1882	2,018	73	2,280 00
1883	5,220	164	3,901 00
1884	5,969	209	6,009 00
1885	7,234	218	5,889 00
1886	3,768	314	3,192 00
1887	26,355	1,642	20,562 00
Totals	175,560	3,867	\$132,481 00

To Japan.

YEARS.	Gallons.	Cases.	Value.
1875	70	168	\$672 00
1876	69	199	796 00
1877	10	227	1,119 00
1878	202	186	937 00
1879	3,415	583	4,766 00
1880	207	75	489 00
1881	832	59	833 00
1882	624	91	834 00
1883	1,095	74	1,479 00
1884	1,940	192	2,359 00
1885	3,332	260	3,657 00
1886	10,124	204	4,570 00
1887	28,375	526	16,401 00
Totals	50,295	2,844	\$38,912 00

To China.

YEARS.	Gallons.	Cases.	Value.
1873		37	\$178 00
1874		25	170 00
1875		16	88 00
1876		51	447 00
1877		84	214 00
1878		61	452 00
1879		97	1,240 00
1880		107	1,818 00
1881		141	2,173 00
1882		62	1,080 00
1883		126	1,648 00
1884		673	2,242 00
1885		302	2,442 00
Totals	8,708	1,742	\$13,890 00

To European and Spanish Countries.

YEARS.	Gallons.	Cases.	Value.
1873		84	\$520 00
1874		138	582 00
1875		107	577 00
1876		181	982 00
1877		142	255 00
1878		157	1,223 00
1879		171	2,532 00
1880		159	2,523 00
1881		191	2,615 00
1882		348	2,639 00
1883		130	2,067 00
1884		73	13,500 00
1885			
Totals	68,198	1,885	\$41,226 00

To Other Countries.

YEARS.	Gallons.	Cases.	Value.
1873		1,081	\$7,982 00
1874		776	7,078 00
1875		102	3,764 00
1876		246	5,888 00
1877		236	4,730 00
1878		271	11,565 00
1879		227	4,296 00
1880		481	2,669 00
1881		306	7,446 00
1882		135	6,916 00
1883		192	8,797 00
1884		280	6,439 00
1885		300	15,545 00
Totals	125,190	4,688	\$100,296 00

It will be well to state here that we have no easy means of ascertaining how much wine and brandy may have been shipped overland by rail, to be afterwards forwarded from some Atlantic city to some foreign country. It is known, however, in a general way, that notable quantities of wine and

brandy have thus been sent across the continent and reshipped to Europe. Neither have I ready at hand a means of ascertaining the amounts of these products sent by rail to our sister republic Mexico, and yet they must be considerable.

The tables of sea exports of brandies from our port to foreign countries naturally follow those of wine, and though for the present this branch of the wine trade does not figure up largely in amounts, it is, nevertheless, of considerable interest, and recently shows very decided and encouraging gains. As our wines become more plentiful, and when those halcyon days for viticulture will arrive, when all the poor wines will be distilled, and only the good ones be sold to the trade and the consumer, then our brandy production will increase, a surplus arise, and a large exporting trade be possible. These tables may then be of some interest and value as a matter of reference and comparison. For the present, not being of as much consequence as the wine tables, I have simplified and somewhat curtailed their compilation.

CALIFORNIA BRANDY EXPORTS BY SEA TO NEW YORK AND FOREIGN COUNTRIES, FROM SAN FRANCISCO, FROM 1875 TO 1887, INCLUSIVE.

To New York.

YEARS.	Gallons.	Cases.	Value.
1875 -----	49,352	74	\$111,041 00
1876 -----	37,365		84,071 00
1877 -----	64,378	6	144,850 00
1878 -----	84,794	6	190,786 00
1879 -----	95,608		205,118 00
1880 -----	95,911	7	215,799 00
1881 -----	58,036	1	129,495 00
1882 -----	43,368	7	96,379 00
1883 -----	34,362	7	79,681 00
1884 -----	18,328	7	41,878 00
1885 -----	11,169		25,027 00
1886 -----	19,173	2	37,702 00
1887 -----	34,710		67,413 00
Totals -----	646,554	117	\$1,429,240 00

To Central America.

YEARS.	Gallons.	Cases.	Value.
1875 -----			
1876 -----			
1877 -----			
1878 -----			
1879 -----			
1880 -----			
1881 -----	185	25	\$486 00
1882 -----	176	13	394 00
1883 -----		103	539 00
1884 -----	273		370 00
1885 -----	180	4	497 00
1886 -----	518	14	1,319 00
1887 -----	453	45	1,490 00
Totals -----	1,785	204	\$5,095 00

To British Columbia.

YEARS.	Gallons.	Cases.	Value.
1875			
1876			
1877			
1878	60	29	\$270 00
1879	24		36 00
1880			
1881			
1882		4	28 00
1883	25	415	2,842 00
1884	42	35	298 00
1885	137	10	251 00
1886	975	105	1,954 00
1887	87	86	711 00
Totals	1,350	684	\$6,390 00

To Mexico.

YEARS.	Gallons.	Cases.	Value.
1875		10	\$70 00
1876	121		272 00
1877			
1878	192	32	508 00
1879	106	13	250 00
1880	100	67	619 00
1881	184	2	410 00
1882	398	32	821 00
1883	600		900 00
1884	56	6	141 00
1885	117	17	390 00
1886	527	61	1,425 00
1887	345	11	996 00
Totals	2,746	251	\$6,802 00

To Honolulu.

YEARS.	Gallons.	Cases.	Value.
1875			
1876			
1877			
1878			
1879	129	60	\$614 00
1880		297	1,589 00
1881	6	167	1,118 00
1882	286		429 00
1883		70	490 00
1884		674	4,718 00
1885	331	40	784 00
1886	239	15	464 00
1887	987	154	2,397 00
Totals	1,981	1,477	\$12,603 00

To Europe.

YEARS.	Gallons.	Cases.	Value.
1875			
1876			
1877	25		\$75 00
1878			
1879			
1880	477	1	1,203 00
1881	980		1,470 00
1882	284	2	401 00
1883	59		118 00
1884	25		50 00
1885	534		740 00
1886			
1887	23,871	145	27,273 00
Totals	26,255	148	\$31,330 00

To Japan.

YEARS.	Gallons.	Cases.	Value.
1875		1	\$10 00
1876		12	120 00
1877			
1878			
1879	704	3	1,125 00
1880	30	7	160 00
1881	15	10	130 00
1882			
1883		2	20 00
1884			
1885		7	10 00
1886	18	1	55 00
1887		2	20 00
Totals	767	45	\$1,650 00

To China.

YEARS.	Gallons.	Cases.	Value.
1875			
1876			
1877			
1878			
1879			
1880			
1881	10	1	\$40 00
1882		11	110 00
1883		4	40 00
1884		1	10 00
1885	3	2	29 00
1886			
1887		25	200 00
Totals	13	44	\$429 00

To Panama and South America.

YEARS.	Gallons.	Cases.	Value.
1875			
1876			
1877			
1878			
1879	53		\$106 00
1880	138	10	278 00
1881			
1882			
1883			
1884	46	30	392 00
1885			
1886		50	350 00
1887			
Totals	237	90	\$1,126 00

To Other Countries.

YEARS.	Gallons.	Cases.	Value.
1875	165		\$412 00
1876			
1877			
1878	644	10	1,549 00
1879	1,888		4,244 00
1880	22	17	225 00
1881	197	213	1,262 00
1882	336	19	906 00
1883	25	15	215 00
1884	137	47	481 00
1885	1,342	136	2,164 00
1886	1,650	148	4,219 00
1887	1,156	171	3,067 00
Totals	7,562	776	\$18,744 00

Total Sea Exports of Brandy from San Francisco to Foreign Ports, by Countries, from 1875 to 1877, inclusive.

	Gallons.	Cases.	Value.
Central America	1,785	204	\$5,095 00
British Columbia	1,350	684	6,390 00
Mexico	2,746	251	6,802 00
Honolulu	1,981	1,477	12,608 00
Europe	26,255	148	31,330 00
Japan	767	45	1,650 00
China	13	44	429 00
Panama and South America	237	90	1,126 00
Other countries	7,562	776	18,744 00
Totals	42,696	3,719	\$84,169 00

Total Sea Exports of Brandy from San Francisco to Foreign Ports, by years, from 1875 to 1887, inclusive.

YEARS.	Gallons.	Cases.	Value.
1875 -----	165	11	\$492 00
1876 -----	121	12	392 00
1877 -----	25	-----	75 00
1878 -----	896	71	2,327 00
1879 -----	2,904	76	6,375 00
1880 -----	767	399	4,074 00
1881 -----	1,577	418	4,916 00
1882 -----	1,480	81	3,089 00
1883 -----	709	609	5,164 00
1884 -----	579	793	6,460 00
1885 -----	2,647	216	4,865 00
1886 -----	3,927	394	9,786 00
1887 -----	26,899	639	36,154 00
Totals -----	42,696	3,719	\$84,169 00

In glancing over the above tables of brandy sea exports to foreign ports, we cannot but note the small amount that has been taken by foreign countries, a little over forty-two thousand gallons, valued at \$84,000, in thirteen years' time. The reason for this is well known to the trade; outside of the relative high price of our brandy even when shipped in bond, that is, by non-payment of the internal revenue tax of 90 cents per proof gallon, the brandy is still too dear to well compete with the cheap imitation brandies sent to all parts of the world in cases and in bulk by Germany, France, and England, and though made of grain or corn spirits, are sold in those markets as genuine Cognac. This statement is fully corroborated by the reports made by our United States Consuls in France and Germany. Besides these fictitious brandies, which are so extensively used in Mexico, China, Japan, the Central and South American States, and the Sandwich Islands, we have likewise to compete in these markets with the still cheaper domestic spirits of those countries, such as rum in Central America, mescal in Mexico, and the distillations from rice in China and Japan, etc.

Furthermore, all these countries demand greater or less customs duties on entries of our brandies, which materially increases their cost, and prevents their greater consumption. In British Columbia, outside of the customs duties, we have to contend against the English, Scotch, and Irish whiskies and gins, and to which the English are already accustomed.

The valuation of the brandy shipped to British Columbia in 1883 seems to be excessive, but the bulk of it may have been some very old brandy distilled in San José, and held at from \$6 to \$8 per gallon, and \$20 to \$22 per case. This brandy is usually sold to clubs.

In the matter of the brandies exported, those shipped to Central America, British Columbia, Mexico, Honolulu, Japan, Panama, and South America, can be reckoned as generally going to the trade. Those to unmentioned countries can be considered as sample lots going partly to the trade and partly to the consumer. That quoted as going to Europe must be taken as merely small sample or trial lots up to 1887, when one trade lot of about twenty-two thousand two hundred and forty-six gallons were shipped direct to Germany as a venture. I surmise this lot will, when properly aged in the German warehouses, and *deftly fixed* and put into the French octave barrels, be returned to our country as a *ne plus ultra* genuine old Cognac brandy, and realize fabulous prices from our ever credulous American dudes.

And it is possible to do this with certain flavorings, as practiced in Europe, and *cutting* down the natural grape flavor with potato or grain spirit, and return the brandy thus disfranchised to the United States, with duties paid at less than \$3 25 per gallon. If cleverly done and sold through some well known importer, this brandy could easily be disposed of in the large eastern markets at from \$8 to \$10 per gallon, if jobbed out in the ordinary course to the trade. The consumer would afterwards most likely pay from \$12 to \$14 for it. That this can be done now, with the proper commercial connections abroad and in our country, and that it will be done in the near future, is my sincere belief. It is rather sad, however, to think that such methods have to be resorted to to induce the free born American patriot to appreciate the once undefiled production of his own country.

And right here, while speaking of the lack of general appreciation of our products among our American citizens, I desire to draw attention to the great injustice done our viticultural industry by the use of the foreign white wines, clarets, and champagnes, at public banquets given by public institutions.

While the figures given in this report very clearly show the growing appreciative acknowledgment of the good qualities of our wines, both in the Atlantic States and foreign countries, I confess with reluctance and some shame, that the average Californian citizen has the weakness and bad taste to allow his ignorance in wine matters to be swayed by his prejudice, and instead of purchasing wine for the sake of wine, purchases and sets on his table and before his guests, wine chosen on account of its high price, and peculiarly fashionable foreign name. Such questionable taste in display may be excusable in private life, but when extended to public banquets, on public occasions, by assemblages of men *supposed* to represent the interests of the State, such as the Chambers of Commerce, the Boards of Trade, the Fourth of July and National Political Committees, it then becomes a comical paradox, a farce beyond consistency, vulgar even to shoddyism, and I am sorry to acknowledge that such occurrences take place almost every day in this community.

In this free country any man has a right to use, eat, and drink what he pleases in private, but when representing a public interest in a public place, with the public money, or money subscribed or called from the community or the public, then he has no right to patronize, or show a partiality, or countenance, a competing foreign product. And I may add that if a consistent public spirit ruled the supposed representative men, political and commercial, of this community, as it does those of other communities, California wines would have the undisputed post of honor at every public banquet, whether it be that of the Chamber of Commerce, or that of the reception of a body of honorable Veteran Firemen, without murmur and without cavil. Fortunately, the present generation is but of a day, and it is to be hoped that their successors will have *some* public spirit, *some* local pride.

Among the most important work that should fall within the scope of this Commission is the endeavor to frame some national law for the protection of pure wine and the detection and prevention of those that are spurious. While the producers are entitled to this encouragement, the consumers, who are much greater in numbers, have a right to demand such protection to their purses as well as to their health. All spurious wines, if they are innocent in their action, should be plainly labeled to indicate their nature, and should be taxed. If not harmless, their manufacture and sale should be prohibited. No matter how cheaply we can produce and sell our wines

on this coast, the additional transportation cost to the Atlantic seaboard will always be great enough to permit a profit to the eastern compounder. Regarding immediate national legislation for the protection of the purity of our wines, and regulations for their sale, there is much to be said, but I will briefly state that the Commissioners of this Board have long ago carefully considered these points, and communicated the results of their deliberations to our Congressmen and Senators, urging them to use all means in their power to secure some effective law for the protection of pure wines. In response to the urgent and continued appeals of the Commissioners, several bills have been submitted on our behalf by Congressmen McKenna, Morrow, Felton, and Thompson, which, if passed, will give our industry great immediate relief. In this matter I may add that the several resolutions passed in our Board and forwarded to our Representatives at Washington, were adopted some two months afterward by the Vine Growers and Wine Makers' Association. As this required legislation will be discussed in the halls of Congress, I will not dwell further upon it; but before dismissing it I would give a timely word of caution to those who ask any reduction either on the tax on distilled spirits or on fruit brandies. I can foresee no greater peril to the advance of wine making in this State than such reductions. The Commissioners, after mature consideration, bringing their practical knowledge to weigh upon the matter in most of its bearings, have wisely concluded that it would be dangerous to our best interests to have the tax on fruit brandy either lessened or removed, except such as may be necessary for the production and preservation of sweet wines or for wines destined for export to foreign countries only. And it is to be hoped this judgment will prevail. In the meantime, the Commission should continue their endeavors to maintain a high internal revenue tax on distilled spirits of all kinds, whether they be grain or corn spirit, rum, alcohol, whisky, fruit or grape brandy. It should vigorously oppose any proposed reduction, for in such reduction lies the easier and most effective as well as the cheapest means of concocting spurious wines and adulterating those that are pure. With cheap distilled spirits all such imitations and falsifications are not only possible, but likewise profitable. The most effective of all ways to prevent and put a stop to this nefarious business of adulteration is to make it unprofitable. We should have pure wines for our whole country, cost what it may.

Next in importance in the work of the Commission should be the gathering of reliable facts in detail concerning the requirements and demands of the wine markets of the world—their requirements in regard to quality as well as quantity; the prices obtained in each great market; the cost and mode of transportation; the terms and methods of payment.

These facts once obtained should be constantly followed up from season to season, showing any changes taking place; should be kept for reference in the rooms of the Commission, free to the inspection of all interested, and should otherwise be published and made known throughout the State for the benefit of the whole viticultural industry whether individual or collective. Changes often take place in the larger wine markets, which, if known and made use of in time, would prove of the greatest assistance in placing considerable amounts of our wines in a profitable manner, and possibly secure us new and continuous markets.

Following these important future labors comes the necessity of establishing experimental vineyards, properly equipped and maintained in every prominent viticultural center of the State, for the sole purpose of ascertaining the adaptability of different vines to raise the best grapes, in the greatest abundance, with the least accidents or disease in the different

localities. Fresno County should have one, Santa Clara County another, Santa Cruz, Los Angeles, El Dorado, Alameda, Napa, Sonoma, and other great wine centers should each have their own experimental vineyards. All these should be modeled after one pattern, and planted in that kind of soil that is the most extensive in each individual district. Vines should be planted in these vineyards that previous preliminary local experimentation had indicated as the more valuable in point of quality, avoidance of danger, accidents, or disease, and giving the best monetary returns, yielding a just medium between the high grade and good ordinary wines which have proven the most remunerative in Europe as they will also do here. I look with the greatest solicitude at the efforts made by some of our vine growers who seek only for the highest known quality, regardless of the well known poor yielding qualities of the vines they plant. It is well enough to experiment in a small way, but to pursue such a course on an extensive scale is fraught with the greatest danger of failure and possibly ultimate financial ruin. What is needed above all considerations with us is good bearers with good quality, for, after all, the only means of proving a vineyard successful is its satisfactory financial returns. We had better leave the discoveries of the California Lafitte, the Chambertins, the Johannisbergers, and Tokays to chance or future generations, and for the present content ourselves in securing abundant yields of real good table wines with satisfactory moneyed returns.

These experimental vineyards should consist of not less than five hundred vines, of each of such varieties as might be considered the most desirable in each district; and these should be pruned and cultivated according to the different and most approved methods. Correct records should be kept for each variety; its general behavior under drought or superabundant moisture, great heat or excessive cold, liability to or freedom from disease of whatever nature it may be.

Observations should be made of that most important of all periods, the flowering of the vine, whether occurring at the season the strong spring and summer winds blow, or at a time when winds are unknown, and all is favorable to nature's effort; the watching for periods when the frost is most likely to occur, and numerous other similar contingencies. Then should follow close observations of the behavior of the vine during the periods of ripening, the first growth of the bunch, the formation of the seed, the swelling of the berry, the coloration of the grape, and the final ripening of the whole bunch. Then should come the testing of the saccharine and the comparison of the ripening periods in the different varieties. Following this would come the relative yield of the different varieties, and last, and most important of all, the market value of each different kind of grape. I would suggest that all the grapes grown on these different experimental vineyards should be sold in the general market, and thus test their relative monetary value practically for a number of years. The income so derived would most likely come near paying the current expenses of each station when the vines came into bearing. Owing to possible complications, it would be better to dispose of the grapes to the wine makers offering the highest price than to incumber the station with wine making, or entering into laboratory work; rather let the market determine the relative values. These experimental vineyards should be under the immediate supervision of the respective Viticultural Commissioners of each district. Of course it is to be supposed that the Governor would appoint practical viticulturists only, and such as are recognized capable of filling so important a position. Such a plan, if carried out, would cause giant strides to be made in every

part of our State towards the discovery of the most valuable grape or grapes for each locality.

Valuable determinations might so be made in less than ten years, while if left to the present limited resources of this Commission, or private experimentation, done in an unsystematic way, it might take fifty years to attain results that at best could not be complete or authoritative.

In continuation of the work of the Commission, the further introduction and popularizing of our wines among our own people in our own country should be immediately entered upon.

Now that we have accomplished the planting of numerous and extensive vineyards, are making some progress towards determining the greater value of a few varieties of grapes over others, and have succeeded in making fairly good average wines, we have the next most important task before us—that of finding consumers for all we will shortly be producing. The best market must be considered the home market. That market is proven the best in every prominent wine-making county of the world, and I can not see why it should not be so with us. The greatest obstacle to our success in this direction is, that the average American is a whisky drinking, water drinking, coffee drinking, tea drinking, and consequently a dyspepsia inviting subject, who does not know the use or value of pure light wine taken at the proper time and in moderate quantities. The task before us, therefore, lies in teaching our people how to drink wine, when to drink it, and how much of it to drink. This serious and most important task should be undertaken at once for the benefit of health and the promotion of temperance. The knowledge of the benefits of proper wine drinking should be heralded by the newspapers, sown broadcast through books, pamphlets, and circulars, proclaimed by lecturers from the rostrum, and championed from the pulpit. The knowledge of how to properly make use of this valuable product to man should be made universal, and handed down from father to son in the same manner as family legends are handed down for generations. The people should be taught in the selection of wines for their daily meal, as are best suited to the maintenance of health and bodily vigor, as well as for agreeableness of taste. They should be taught the value of the different kinds of wine as food adjuncts; they should be taught in detail the simple but very necessary cares needed for the preservation of their household wines, and their presentation on their tables in a proper condition and attractive manner. Extracts from such books as that written by Dr. Druitt, the eminent physician and viticultural writer, should be freely circulated throughout the land, and placed within the reach of the masses to learn the use of wine, to beware of its abuse, and become the exponents of true temperance. At this stage of our viticultural progress, I consider it more important to teach the people the proper use of wine as a daily beverage, than the extension of our vineyards, or any other viticultural work that the Commission can enter upon. At this critical moment our future success depends upon the immediate popular increased consumption of our wines, more than greater production, increased quality, or any other thing that I can think of.

And while we are considering the matter of greater consumption and larger markets for our wines in our own country, it may be well to draw attention to the fact that freight rates very greatly influence the possible increase or decrease of our eastern and interior shipments. Thus, under former stiff rates, our shipments eastward shows a pretty constant annual increase of three hundred thousand gallons, from year to year, for nearly ten years. Under the lower rates of 1885 the increase suddenly went up to seven hundred thousand three hundred and fifty gallons over the pre-

vious year. And in 1886, when *cut rates* were ruling, there was a further increase over that of the year 1885 of nine hundred and thirty-six thousand gallons. It would be well for the transportation companies to consider this fact, and devise some means for the transportation at such rates as will permit this industry to develop its magnitude, and increase their own carrying trade. Owing to the distance separating us from our natural markets, we, in California, have much to contend against. The wood from which our shipping casks are made is brought from the east by rail, and is charged for at so much a pound, coming to us empty, and so much a pound going away from us filled with wine. These additional costs, and they are not moderate, increase the price of wine to the consumer, and tends to prevent its more general use in the Atlantic and Western States. When our wines, in all their unrivaled purity, can be laid down at the door of the eastern laborer at the same price to him as beer, this industry will develop beyond our most sanguine expectations.

Shortly after the organization of the Commission the need of a viticultural library was keenly felt, and as soon as our funds permitted the outlay. the proper committee set about collecting all the works obtainable. printed in the English language, on vine growing, diseases of the vine, wine making, and fermentation. Then all procurable French works relating to these were added through much labor and some considerable delay. At the present time a collection is under way in the procuring of German, Italian, and Spanish works covering the same subjects.

At this date our library consists of four hundred and twenty-one volumes, and is without doubt the most complete viticultural library in America, and one that our State may well be proud of. The detailed catalogue of these books you will find in the report of the Secretary herewith transmitted.

As a matter of future reference, I herewith transmit the following volumes and pamphlets printed under the auspices of the Commission. a number of which being out of print are not easily duplicated and hence the more sought after:

- Annual Report of the State Viticultural Board of Commissioners, 1881.
- First Annual Report of the Chief Executive Viticultural Officer, 1881.
- Insects Injurious to Fruit and Fruit Trees of California.
- Annual Report of the Board of State Viticultural Commissioners, 1882.
- First Report of the State Horticultural Commissioners of California, 1882.
- Second Annual Report of the Chief Executive Viticultural Officer—Appendix I—1882, 1883.
- Second Annual Report of the Chief Executive Viticultural Officer—Appendix II—1882, 1883.
- Second Annual Report of the Chief Executive Viticultural Officer—Appendix III—1882, 1883.
- Annual Report of the State Board of Horticulture, 1883.
- Report of the Third Annual State Viticultural Convention, 1884.
- Ampelegraphy of California, by Charles A. Wetmore, Chief Executive Viticultural Officer, 1884.
- Viticulture and Viniculture in California, from Reports of the Board of State Viticultural Commissioners, 1885.
- Report of the Fourth Annual State Viticultural Convention, 1886.
- Report of the Fifth Annual State Viticultural Convention, 1887.
- Annual Report of L. J. Rose, Commissioner for the Los Angeles Viticultural District, 1887.
- Annual Report of I. DeTurk, Commissioner for the Sonoma Viticultural District, 1887.
- Annual Report of George West, Commissioner for the San Joaquin Viticultural District, 1887.
- Annual Report of the Chief Executive Viticultural Officer—Oidium (Tuckeri) and the Use of Sulphur, Appendix I—1887.
- Annual Report of the Chief Executive Viticultural Officer "The Pure Wine Bill," Appendix II—1887.
- Annual Report of the Chief Executive Viticultural Officer—"Bleaching Seedless Sultana Raisins," Appendix III—1887.

Annual Report of the Chief Executive Viticultural Officer—"How to Avoid and Correct Imperfect Fermentation," Appendix IV—1887.

Directory of the Grape Growers and Wine Makers of California, containing the names and post office addresses of nearly six thousand California viticulturists.

Following these, as soon as the State Printer can get them printed, will come the Annual Report of the Commission for 1887, which will contain:

Report of the President, Arpad Haraszthy.

Report of Commissioner L. J. Rose, for the Los Angeles District.

Report of Commissioner I. DeTurk, for the Sonoma District.

Report of Commissioner George West, for the San Joaquin District.

Report of Commissioner Charles Krug, for the Napa District.

Report of Commissioner Charles A. Wetmore, for the San Francisco District.

Report of the Secretary of the Board of Viticultural Commissioners, which will include sessions of the Board, accounting of expenditures, property on hand, including the catalogue of the library, etc.

Report of the State Analyst on wines, finings, and other materials analyzed. Also the safety of using arsenic remedies against vineyard pests.

Report of the Chief Executive Viticultural Officer, including work of the year 1887.

Appendix I—Oidium and the Use of Sulphur.

Appendix II—The Pure Wine Bill Explained.

Appendix III—Bleaching of Sultana Raisins.

Appendix IV—How to Avoid and Correct Imperfect Fermentation.

Then in due course will follow the report of the Sixth Annual State Viticultural Convention, which will contain all the original papers read during the Convention; the most important discussions there entered into; a complete list of wines submitted for investigation, together with a list of those awarded the highest classification, and other matters of interest and value.

I regret to state that owing to the insufficient appropriation made the State Printing Office, much of the value of the work of the Commission is lost. It often happens that information comes to this office, which, if printed immediately, and sent at once to the vine growers of the State, would be of great value to them, and yet when such chances come about, it was found that the State Printer had other work ahead, or that the appropriation of his office was exhausted; the latter being most generally the case. We have thus been continually thrown upon the public spirit and generosity of the newspapers. These, though always willing to accord a certain amount of their valuable space, could not give all that we have often required. In the matter of engravings and illustrations, the Commission has been made to shift as best it could, for those very great essentials could not be supplied by the State Printer, and yet in viticulture cuts and illustrations are often quite as necessary and valuable as the letter press itself. Some remedy should be found to overcome these drawbacks, and the first that suggests itself is a very largely increased appropriation for the State Printer's office, as well as more discretionary latitude accorded to the State Printer himself, in the use of the funds of the appropriation.

The tariff question is another matter of very serious import to the wine and raisin producers of our State, and should demand our continual watchfulness. A high tariff on foreign wines has been the means of introducing our wines among our own citizens, extending the area of our vineyards, giving a living employment to more than thirty thousand souls of the population of California, increasing its wealth, and giving the whole of the United States wine cheaper than it could have ever been had from foreign countries without such protective tariff. It is internal competition, that strong regulator of labor, wages, and enterprise within a country, that has made wines so cheap with us that the poorest workman in the land no longer looks upon it as a luxury, and need not be without it. I doubt whether such results could ever have been brought about except by a protective tariff. In fact, our large plantings, and the largely increased con-

sumption of our wines, began only after the tariff was raised, and to-day the result shows that the consumer is the one that has profited most by the change. A reduction of tariff on any article competing with American industry, whether it be wine, raisins, wool, silk, or sugar, or anything else, and we should bear it well in mind, is a blow struck at us, at our industry, at our homes. If we want protection for ourselves, then we should uphold every branch of American industry that we can encourage with our voices and protect with our votes.

Respectfully,

ARPAD HARASZTHY,

President of California Board of State Viticultural Commissioners.

ANNUAL REPORT
OF
CHARLES KRUG,
Commissioner for the Napa District, 1887.

To the Board of State Viticultural Commissioners :

GENTLEMEN : I have obtained the following statistics for Napa County, having devoted myself most exclusively to this county, because it ranks first in importance in this district. I had hoped to gather important data respecting the other counties included in this district, but for want of time, have found it impossible up to the date of this writing.

Yours respectfully,

CHARLES KRUG,
Commissioner for the Napa District.

VARIETIES OF GRAPES PLANTED.

Post Office.	ACREAGE.		All Riesling	Chasselas Font., Palomino, and Burger	Sauternes, incl. Sauv. Vert	Cab. Sauv., Fr. Merlot, Verdot, Malbec	All Reds, except Zin., Miss., and Malv.; all Pinots, Ch. Noir, Ali- cante, Petit, etc.	Zinfandel	Mostly Miss. and Malv.	Table and Raisin	Tons of Grapes— 1886	Gallons of Wine made—1886	Gallons of Brandy made—1886	Resistant Vines, Acres—1887
	1881.	1887.												
Conn Valley	223	657	32	112	3	5	60	390	53	1	1,390	150,000		
Spring Mountain	55	355	11	58	5	10	20	216	32	3	400	21,000		
Pope Valley	20	165	2	29		1	1	36	85	4	156	4,000		
Beryessa	18	33		5				12	16		450			
Childs Valley	13	129	15	16	8	5	10	55	20		196	6,000		10
Howell Mountain	100	696	85	110	20	65	150	215	45		390	40,000		20
Calistoga	250	1,716	254	243	25	119	160	522	275	12	2,600	646,000		72
St. Helena	1,611	5,246	963	797	83	265	551	1,831	694	17	14,387	1,777,000		49
Rutherford	721	1,527	260	213	55	45	191	452	94		4,611	464,000		20
Oakville	429	1,085	317	144	33	54	89	433	99	11	4,032	800,000		30
Yountville	585	1,474	264	339	43	28	117	582	195	12	3,960	212,000		25
Napa	1,240	3,340	433	531	137	192	259	1,000	423	50	7,303	348,000		425
	5,285	16,611	2,636	2,537	412	779	1,608	5,741	2,631	109	39,595	4,468,000	102,322	651

THE ADVANTAGES OF PLANTING VINES 3½x14 FEET.

[A treatise prepared by CHARLES KRUG, Commissioner for the Napa District.]

The most common system of planting adopted in California is that of squares, with the vines placed at seven feet apart. Some sections adopt a greater distance, eight feet prevailing in many interior districts—some vineyards even exceeding this, running up to ten, or even twelve feet.

These greater distances have been chosen for several reasons. It greatly facilitates the plowing and working of the vines, gives a less number to plant, prune, and care for, and where raisin and table grapes are desired, the size and beauty of the berry is considerably improved.

European countries, devoted to wine making, crowd the vines close together, two and one half to three feet from each other in the rows, and the rows three or four feet apart. Close planting is particularly practiced in the renowned vineyards, where it is thought the small quantity of grapes thereby produced on each plant adds to the quality of the wine.

In the spring of 1881 I had sixteen acres of choice varieties of vines planted on Howell Mountain, and chose for distances three and one half feet in the rows, the latter being fourteen feet apart. I selected this method on account of the easier plowing secured thereby on the steep hillside which formed the locality chosen. Lately I have adopted this method for planting on valley land, convinced that it possesses many advantages over the "square" system heretofore employed. Some of these advantages may be enumerated, as follows:

1. Fifty per cent of the plowing now done with one horse will be performed with two animals and a large plow, thus securing deeper and more perfect tillage. The larger tools accomplish the work more rapidly, and three or four horse tools may be easily and safely worked in the rows—each one forming a complete avenue.

2. The gathering of the brush will consume only one third of the time and labor that is commonly employed in carrying it to avenues some distance apart. Here the prunings may be thrown into piles at convenient distances along the fourteen feet rows and burned, without danger to the vines, and each pile will thus return to its respective vines a fair portion of the fertilizers produced in its ashes.

3. Sulphuring may be done more quickly and economically in the fourteen feet rows, as a cart or wagon may be used to haul the barrel of sulphur to the laborers—this throughout the whole vineyard, and the driver may even assist in the work without leaving his vehicle.

4. Spraying the vines—a practice which is likely to come into vogue in our vineyards some day, as it has in European vineyards—would be greatly facilitated, in that the whole appliance may be hauled and worked by horse power. At present the prevailing custom is for each operator to carry the solution in a reservoir strapped on to his back.

5. The empty grape boxes can be easily and directly distributed to the pickers, and the boxes, when full, may be placed directly upon the wagon to be hauled to the cellar. Much time and labor is at present wasted in forcing the pickers to carry the heavily loaded boxes some distance to the avenues, perhaps from the middle of the block.

6. When cultivating has ceased—usually in June—for two months, the teams, which are otherwise likely to be idle, may be profitably used to improve the land by hauling manure to the vines, filling up low places with dirt or sand, or carrying off roots, etc. Also, the work of preparing

drains and such, may be all easily and cheaply done without, in anywise, interfering with the growing vines.

But this method recommends itself not only for planting new vineyards, but also for changing old vineyards from seven by seven feet to three and a half by fourteen feet, or from eight by eight feet to four by sixteen feet, giving the proprietor a fine opportunity to transform his vineyard from a *vinifera* root vineyard to a resistant root vineyard. This can be accomplished by planting resistant roots in the alternate rows to be preserved, right between the two old vines. As soon as these resistant roots produce four feet long canes, the adjoining old *vinifera* vines, in the same rows, when attacked by phylloxera or otherwise, may be taken out and the canes from the resistant vines laid under ground to the place where the old *vinifera* vines stood; which layers, with the support of the nourishment from the mother roots, will make a rapid growth and be soon strong enough to be grafted. In the meantime the second rows should be taken out as soon as the grafted resistant vines and layers are producing a crop. They then continue to bear their usual amount of grapes, and the income from the vineyard is only slightly lessened during this transformation.

Our old vineyards planted to Mission and Malvasia will soon be matters of the past. Fine varieties are being grafted on their roots, or the old stumps are pulled out and resistant stock put in their place, when grafting to fine varieties follows in a year or two afterwards. Vineyards suffering from the ravages of the phylloxera are greatly favored by this process.

For varieties, grafts are taken mostly from *Cabernet Sauvignon*, *Cabernet Franc*, *Petite Sirrah*, *Mondeuse*, *Miller's Burgundy*, *St. McCaice*, *Beclan*, *Carignan*, *Mataro*, *Tannat*, etc. (red), or from *Riesling*, *Semillon*, *Sauvignon Blanc*, *Folle Blanche*, *Traminer Sylvaner*, *Sauvignon Vert*, etc. (white); and the quality of future vintages produced from these will soon surpass all previous ones.

The low price of grapes and vines which have ruled during the past two years have caused a perfect stagnation in vineyard planting in our district. Many parties before interested in viticulture are discouraged. I wish to assure them that their doubts in regard to success are without foundation. Inferior wines will soon disappear from our markets: only fine wines will be offered to consumers: the demand for our better goods will continue to steadily increase, and the common sense of the American people will not, as has been thought by some, be permanently misled by the prohibitionist. Wine and brandy warehouses will give the vintner a chance to refuse ruinous prices. In short, our industry will soon again see better days, and grape growing and wine making will yet again be the best paying industry in our glorious State. The counties raising the best dry wines will stand on the top of the ladder and command the markets of the country.

CHARLES KRUG,
Viticulural Commissioner for the Napa District.

REPORT OF THE COMMITTEE APPOINTED TO EXAMINE INTO
THE USES OF MERCURY FOR DESTROYING PHYLLOXERA.

[By CHARLES KRUG, Chairman of the Committee.]

ST. HELENA, June 27, 1887.

To the Board of State Viticultural Commissioners:

GENTLEMEN: At the regular meeting of the Board, held in the early part of the present month, you appointed a committee to examine the Hagen Vineyard, near Napa, in order to determine the effect of the mercurial remedy which had here been applied for the destruction of phylloxera some years previous. This committee consisted of Charles Krug, H. W. Crabb, and your Chief Executive Officer, J. H. Wheeler. It is now my duty to report to you thus promptly the result of our investigations.

First, let it be understood that the remedy had been applied under the personal direction of its inventor and exponent; it may therefore be presumed that the work was properly and thoroughly done. To prepare the mercury for this use, it is reduced by triturating with clay to a state of minute division. A small quantity of the mixture, sufficient to include one half ounce of quicksilver, is placed in the hole prepared for receiving the cutting or rooted vine. Its presence here, and spreading—a quality peculiarly possessed by this metal—is expected to destroy the phylloxera, and preserve the vines from further attacks.

Mr. Crabb was unable to accompany me, but Mr. Wheeler and myself, on the sixteenth instant, examined carefully the vines treated, together with those left untreated in Mr. Hagen's vineyard, and could observe no difference in favor of the remedy. The vines were young, of only a few years planting. The roots of many of those treated we dug up, and they revealed the presence of a multitude of insects actively engaged with their work of destruction, their damage plainly evidenced by the swollen roots, rotten fibers, and nodosities. All of the plants exhibited a languishing appearance in the foliage, and proved unsatisfactory in other respects.

It will be remembered that exhaustive experiments were conducted by this Board with the same remedy, in Sonoma and elsewhere in 1885 and later, with results identical with those here noted and reported; and although the Board was satisfied at that time as to the inefficiency of the remedy, this committee was appointed and attention was again called to the matter at the solicitation of the inventor of the remedy.

We are now able to confirm the results announced some years since as to the total inefficiency of the so called remedy.

OTHER OBSERVATIONS ON RESISTANT VINES.

A few Lenoir vines were found apart from the treated spot, but on similar soil and with other conditions equal. These, though not treated with any remedy, exhibited a vigorous growth, notwithstanding the presence of the few phylloxera which we found on their roots.

Riparias, also untreated, were found on the same ground; they showed a small growth, though the roots were free from phylloxera or nodosities. The *Californica* had been tried, too, but they did not appear healthy or vigorous, and the roots were found infested, very knotty, and bad.

While visiting Mr. Hagan's vineyard, we were led to examine an old wild vine—*V. californica*, which appeared like one infested with phylloxera.

This surmise proved correct, for the roots were found destitute of healthy fibers, and the old roots, where not already rotted, were actively crowded with the dreaded pests. This vine was large and old, growing in its native soil, and that the rich mould of a creek bottom. The cañon wherein it grew was some distance from the nearest growing infested *viniferas*, and it seemed that the disease must have come to the wild vine through the winged form.

The Commission has often sought for evidences of phylloxera on our wild vines in their native state, but up to this time none have been found, this being the first case of the kind discovered.

Yours very respectfully,

CHARLES KRUG,
Chairman Committee.

MEANS OF FORETELLING FROST.

[Correspondence of CHARLES KRUG.]

With a view to providing facilities for anticipating frost and averting the damage, as we may sometimes do, by means commonly known, I have thought it advisable to append the following, which has provided a grain of comfort to me and others who have suffered somewhat during the present season. The letter explains itself so lucidly as to call for no comment from me, and I desire to express to Mr. Maxfield particular obligation for his promptness and courtesy.

CHARLES KRUG.

SIGNAL OFFICE, WAR DEPARTMENT (BRANCH), }
SAN FRANCISCO, CAL., March 22, 1887. }

MR. KRUG, *Saint Helena, California:*

DEAR SIR: I am pleased to inclose herewith instructions for the use of the wet and dry bulb thermometers, and a dew-point table, which I hope will prove satisfactory to you in foretelling frost.

Very respectfully yours,

J. E. MAXFIELD.
Second Lieutenant, Signal Corps, U. S. A.

THE WET AND DRY-BULB HYGROMETER.

To keep this instrument in working order, one or two things require special attention. The thermometers must be alike, for if one is filled with mercury, and the other with spirits, or if they contain different quantities of the same fluid, the readings will be vitiated. All starch, or foreign matter, should be washed out of the thin muslin covering and cotton wicking. The water used should be pure, for if lime or other salts be dissolved in it, the muslin will soon be coated with a calcareous or other incrustation. Rain or distilled water should be used. The muslin ought to be changed when covered with dust or other impurities, and care should be taken not to touch the muslin with the fingers, otherwise it will get slightly greased, and capillary attraction will be thereby interfered with. The bulbs of the thermometers should be made one and one half or two inches below

the scale. The thermometers should also be a little apart from each other, and the vessel containing the water be as far removed as possible from the dry-bulb. The thermometer should be exposed to the air where the circulation is unobstructed. They should face the north, and should always be in the shade. They should be removed at least a foot from the wall of any building, and should be about ten feet from the ground. They should be protected against the heat reflected by neighboring objects, such as buildings or a sandy soil, and they should be sheltered from the rain. If the dry-bulb should become moistened by rain, the bulb should be carefully dried about five minutes before making the observation; since drops of water, by their evaporation, would lower the temperature of the mercury in the bulb.

The dew-point can readily be determined by the following rule and table:

Rule.—Subtract the readings of the wet-bulb from that of the dry-bulb; find the temperature of the dry-bulb in the left hand column of the table, opposite which, in the column that is marked at the top, with the difference between the wet and dry-bulb, is to be found the dew-point sought.

Example {	Dry-bulb	47°
	Wet-bulb	40°
Difference of depression of wet-bulb		7°

Looking for the temperature of 47° on the left of the table we find in the column under the 7° the figure 28, which is the dew-point.

Whenever the dew-point in evening is below 32°, expect a frost before morning if sky is clear and there is not much wind.

DEW-POINT TABLES.

Air Temperature.	DIFFERENCE BETWEEN READING OF DRY AND WET-BULB.													Air Temperature.	
	0	1	2	3	4	5	6	7	8	9	10	11	12		13
*30	*30	*27	*24	*21	*17	*13	*7	+1	+11	+30	-----	-----	-----	-----	*30
31	31	28	25	22	18	14	9	*2	+7	+23	-----	-----	-----	-----	31
32	32	29	26	23	20	16	11	5	+3	+17	-----	-----	-----	-----	32
33	33	30	27	24	21	17	13	7	+1	+12	+32	-----	-----	-----	33
34	34	31	28	26	22	19	15	9	*2	+7	+23	-----	-----	-----	34
*35	*35	*32	*29	*26	*24	*20	*16	*11	*5	+3	+17	-----	-----	-----	*35
36	36	33	30	27	24	21	18	13	8	+1	+12	+32	-----	-----	36
37	37	34	32	29	25	21	19	15	9	*3	+7	+23	-----	-----	37
38	38	35	33	30	26	23	19	17	11	6	+3	+16	-----	-----	38
39	39	36	34	31	28	24	20	16	14	8	0	+11	+31	-----	39
*40	*40	*37	*35	*32	*29	*26	*22	*18	*12	*10	*3	+6	+22	-----	*40
41	41	39	36	33	30	27	23	19	14	8	6	+2	+15	-----	41
42	42	40	37	34	31	28	25	21	16	10	3	*2	+9	+29	42
43	43	41	38	35	33	30	26	22	18	13	6	+3	+5	+20	43
44	44	42	39	37	34	31	27	24	20	15	9	*1	+12	+13	44
*45	*45	*43	*40	*38	*35	*32	*29	*25	*21	*17	*11	*4	+7	+27	*45
46	46	44	41	39	36	33	30	27	23	19	14	7	+2	+18	46
47	47	45	43	40	37	35	32	28	25	21	16	10	*2	+11	47
48	48	46	44	41	39	36	33	30	26	22	18	12	5	+6	48
49	49	47	45	42	40	37	34	31	28	24	20	15	8	+1	49
*50	*50	*48	*46	*43	*41	*38	*36	*33	*29	*26	*22	*17	*11	*3	*50
51	51	49	47	45	42	40	37	34	31	27	23	19	13	6	51
52	52	50	48	46	43	41	38	35	32	29	25	21	16	9	52
53	53	51	49	47	44	42	40	37	34	30	27	23	18	12	53
54	54	52	50	48	46	43	41	38	35	32	28	24	20	15	54
*55	*55	*53	*51	*49	*47	*45	*42	*39	*36	*33	*30	*26	*22	*17	*55
56	56	54	52	50	48	46	43	41	38	35	32	28	24	19	56
57	57	55	53	51	49	47	45	42	39	36	33	30	26	22	57
58	58	56	54	52	50	48	46	43	40	38	35	31	28	24	58
59	59	57	55	53	51	49	47	45	42	39	36	33	29	26	59
*60	*60	*58	*56	*54	*52	*50	*48	*46	*43	*41	*38	*35	*31	*28	*60
61	61	59	57	56	54	52	49	47	45	42	39	36	33	29	61
62	62	60	58	57	55	53	51	48	46	43	41	38	35	31	62
63	63	61	60	58	56	54	52	50	47	45	42	39	36	33	63
64	64	62	61	59	57	55	53	51	49	46	44	41	38	35	64
*65	*65	*63	*62	*60	*58	*56	*54	*52	*50	*48	*45	*42	*39	*36	*65
66	66	64	63	61	59	57	55	53	51	49	46	44	41	38	66
67	67	65	64	62	60	58	56	54	52	50	48	45	43	40	67
68	68	66	65	63	61	59	58	56	54	51	49	47	44	41	68
69	69	67	66	64	62	61	59	57	55	53	50	48	45	43	69
*70	*70	*68	*67	*65	*63	*62	*60	*58	*56	*54	*52	*49	*47	*44	*70
71	71	69	68	66	65	63	61	59	57	55	53	51	48	46	71
72	72	71	69	67	66	64	62	60	58	56	54	52	50	47	72
73	73	72	70	68	67	65	63	61	60	58	56	53	51	49	73
74	74	73	71	69	68	66	64	63	61	59	57	55	52	50	74
*75	*75	*74	*72	*70	*69	*67	*65	*64	*62	*60	*58	*56	*54	*51	75
76	76	75	73	71	70	68	67	65	63	61	59	57	55	53	76
77	77	76	74	72	71	69	68	66	64	62	60	58	56	54	77
78	78	77	75	74	72	70	69	67	65	64	62	60	58	55	78
79	79	78	76	75	73	71	70	68	66	65	63	61	59	57	79
*80	*80	*79	*77	*76	*74	*73	*71	*69	*68	*66	*64	*62	*60	*58	*80

* Above zero. † Below zero.

ANNUAL REPORT

OF

I. DETURK,

Commissioner for the Sonoma District, 1887.

To the Board of State Viticultural Commissioners:

GENTLEMEN: The undersigned Viticultural Commissioner for Sonoma District, which includes the counties of Sonoma, Marin, Lake, Mendocino, Humboldt, Del Norte, Trinity, and Siskiyou, herewith submits a report of the grape-growing interest of said district.

Since making the last report, there has been a large increase in acreage, and a marked improvement in varieties of wine grapes.

QUALITY.

We find the quality of our wines very much improved as the vineyards age. The old Mission grape, that years ago made very harsh and rough wines, now produces from the same vineyard wines which would not be recognized as Mission; these wines are now mild, soft, and agreeable in taste. There is no doubt that as the vineyards age, we will be able to produce as good wines as those from European vineyards.

We must, however, look to the best European varieties of wine grapes for the future fine wines of California, it having been thoroughly proven by actual experience that the fine wine grapes of Europe preserve their best characteristics in California. I would recommend to all those who intend setting out new vineyards, that they plant only the choicest European varieties, as these varieties are now abundant enough to be obtained from almost any of the vineyards throughout this district.

SONOMA COUNTY.

According to the assessor's report of Sonoma County, there are twenty-five thousand acres planted in vineyard, aggregating twenty million vines. Sonoma Valley and adjacent hills have long since proven their superiority for fine wines, and the country lying between the Sonoma Valley, Santa Rosa, Healdsburg, and Cloverdale, has a well established reputation for fine quality in grapes and wine.

Experience has taught that the hilly lands of this district are specially adapted to the wine grape. In fact, the same rule applies in California as in Europe, viz.: the best wine grapes are produced on hilly land.

YIELD OF WINE.

It is well known that in the famous vineyards of Europe, the yield of wine is comparatively small. It is not claimed that the vineyards of Sonoma District yield so largely of grapes as other grape-growing sections, but we believe the future will prove our wines to be of superior quality.

AGING.

It has been claimed that California wine does not improve after two or three years, and that the wine should be drunk by the time it is three years old. This advice is calculated to deter people from holding their wine to age. The fact is, that California wine improves by age as much as any other wine. However, the wine for aging must be sound and well fermented. My experience is that wine is not a good and wholesome drink until it is two years old and over.

VARIETIES FOR IMPROVEMENT.

As a greater portion of our vineyards are planted with Zinfandel for red wine, I would recommend for improvement in quality, grafting in say from five to ten per cent of Cabernet Sauvignon, Cabernet Franc. or Merlot: these varieties are shy bearers, but of high quality. For quantity and quality combined, I would recommend the Tannat and St. Macaire. By such grafting we will by degrees improve and change the quality of our wines in a few years, to such an extent as to defy competition and adulteration. Ordinary wines are easily imitated, but fine wines cannot be imitated by artificial means; neither can ordinary wines be flavored to equal fine wines. To change the vineyards of ordinary white wine grapes, I would recommend grafting in Johannisberg Riesling, Semillon Blanc, and Sauvignon Blanc. The Johannisberg Riesling is perhaps the finest of all white grapes, but is a very small bearer.

DISEASES OF THE VINE.

From general information and personal observation, I am pleased to report the absence of any alarming disease among the vineyards in Sonoma district, with the exception of phylloxera.

In Sonoma Valley the phylloxera has been found since the earliest knowledge of its existence in the State, and is slowly but surely advancing. It has reached within six miles east of Santa Rosa, where it has been found in one vineyard.

I am happy in being able to report that Mr. Dressell and others of Sonoma have proven beyond a doubt that the native wild vine of the Eastern States, *Vitis riparia*, thoroughly resists the phylloxera. Further, it is practically demonstrated that the grafting of fine European varieties on this resistant stock is a grand success.

CLIMATE.

The frost has occasioned considerable loss in some of the vineyards through the middle and southern portion of the county; the damage aggregates about 25 per cent. It is thus far impossible to estimate the damage by blight or coulure. I estimate the crop of 1887, 33 per cent less than was that of 1886. The northern part of Sonoma County escaped frost, and the crop prospect is reported to be fully as large as that produced in 1886.

A comparatively new district has recently been developed, known as Green Valley, lying on the lower part of the Russian River, adjacent to and among the redwood country west of Santa Rosa, where there are some of the finest and most promising young vineyards of the State. This section bids fair to have in the near future a reputation second to none other in the county.

The energetic and enterprising viticulturist, Guy E. Grosse, of Santa Rosa, has demonstrated the fact that there are thousands of acres of land in the

Sonoma District which, though at one time covered with brushwood and heavy undergrowth, and considered worthless, can now be classified among the best wine and fruit lands in the country. They need only proper clearing of brush and stone. The same lands now carry a value of from \$300 to \$500 per acre when worked into good condition for cultivation.

Number of Gallons of Wine Manufactured from Vintage of 1886.

Cloverdale	200,000
Geyserville	150,000
Healdsburg	200,000
Windsor	150,000
Fulton	40,000
Santa Rosa	500,000
Lay Clark & Co.	80,000
Hill, Korbell, Lehn, Torrance	100,000
Sebastapol	80,000
Petaluma	40,000
Glen Ellen	500,000
Los Gullicos	200,000
Sonoma	1,000,000
Bennett Valley	260,000
	3,500,000
Tons of grapes	25,000

LAKE COUNTY.

There are quite a number of promising young vineyards in this county, and with the climate, adaptability and nature of the soil, Lake County will in the future be one of our first class wine counties.

MENDOCINO, AND OTHER COUNTIES.

Of Mendocino County I cannot obtain any positive information, but from what I have learned there is but very little attention given to vine culture. I can also report the same of Siskiyou, Humboldt, Trinity, and Del Norte. Marin County is slowly but surely increasing her vineyards.

Respectfully submitted.

I. DETURK,
Viticultural Commissioner for the Sonoma District.

ANNUAL REPORT

OF

GEORGE WEST,

Commissioner for the San Joaquin District, 1887.

STOCKTON, June 30, 1887.

To the Board of State Viticultural Commissioners:

GENTLEMEN: A review of the progress made in viticulture in this district since my last report is very gratifying. Two years ago the only counties that made any pretensions toward grape growing were San Joaquin and Fresno, while now the greatest interest is taken in viticulture throughout the whole San Joaquin Valley, and there has been an immense increase in the acreage both of wine and raisin grapes, notably in Fresno County.

SAN JOAQUIN COUNTY.

It has been impossible to obtain an exact estimate of the acreage planted in vines in San Joaquin County, for the reason that the lands were long since divided into comparatively small holdings, and as they are almost universally fine, and nearly all well adapted to grape growing, a great many small vineyards have been planted, the exact acreage of which has been impossible to obtain. However, I consider two thousand acres a low estimate; and I am pleased to note in this connection that nearly all the vineyards that have been planted in the past two years have been planted in the very choicest varieties of vines, the preference for wine grapes being for the Tannat, Cabernet Sauvignon, Cabernet Franc, Mondeuse, Verdot, Malbeck, St. Macaire, Petit Bouschet, Trosseau, and Mataro, for red wines; the Folle Blanche, White Prolific, Boal, and Colombar, for white wines and brandies. For table grapes, the Black Prince, Tokay, Emperor, and Black Ferrara are almost exclusively planted.

I would urge the planting of resistant stocks in all cases, the extra expense being amply repaid by permanency of the vineyard secured thereby.

PROSPECTS OF INCREASED ACREAGE.

It is probable that the coming winter will see a large increase in the acreage of vines, as the profits derived from the industry in this section are very satisfactory, the yield being phenomenally heavy, and the quality of the product excellent. San Joaquin County is so situated that both sweet and dry wines can be produced. No vineyards are planted in raisin grapes, for the reason that the season for drying is so short as to make the venture hazardous.

TABLE GRAPES.

Table grapes of a quality unexcelled are produced on the black lands around Stockton, and a considerable acreage is devoted to their culture. These grapes are mostly shipped to the eastern markets, and the profits

of the growers are very large. I look for wonderful developments in this branch of the industry. Lands can be purchased at from \$50 to \$150 per acre, according to location; and many of our wheat farms will be subdivided and sold at those figures during the coming winter.

No irrigation whatever is required for the growth of the vine in most parts of San Joaquin County; and wherever it is practiced unnecessarily it is at the expense of the quality of the product.

STANISLAUS AND MERCED COUNTIES.

Stanislaus and Merced Counties are just awakening to the importance of grape growing to the future developments of their lands. Both these counties contain a small acreage of old vines and a more considerable acreage of vines of recent plantation. Good wines have been made in both counties, and with the better varieties of vines now being planted we may reasonably expect an improvement in the product. Raisins of excellent quality will undoubtedly be produced, as the warm dry nights would seem especially adapted to the curing of the grape. Both of these counties contain countless acres of fine land, all of which has been devoted to wheat growing.

Several irrigation schemes are assuming definite shape, and a large amount of land will soon be placed on the market. It is probable that both Stanislaus and Merced Counties will make the same rapid advancement that has been made in the more southern county of Fresno.

FRESNO COUNTY.

No county in the district can show such wonderful development in so short a time as Fresno. At the time of my last report the acreage of this county was placed at seven thousand five hundred acres, while now it will be seen from the statistics appended to this report that nearly fifteen thousand acres are planted in raisin and wine grapes, of which nine thousand five hundred acres are in raisin grapes, the balance in wine grapes. The profits from both branches of the industry are satisfactory to the growers.

The vintage of last season amounted to about one million five hundred thousand gallons of wine, nearly all of which has been sold at remunerative prices. The vintage of 1887 will be much heavier as a large acreage of young vines will be in bearing. A large part of the young plant of Fresno County is devoted exclusively to port, sherry, and brandy varieties, it being generally conceded that the San Joaquin Valley will excel in these products. Fresno County will undoubtedly be the banner raisin-producing county of the State, the climate being exceedingly well adapted to the curing of the grape.

THE RAISIN INDUSTRY.

The raisin pack of 1886 was about two hundred and fifty thousand boxes, and the amount will be materially increased this season. The profits of the business are large and it is one particularly attractive to people of limited means, the heavy investments necessary to the wine business not being required. Many growers sell their products to the packers, in the sweat-boxes, and realize a handsome income from a small acreage of vines. An immense number of small vineyards will be planted this winter in raisin grapes throughout Fresno County.

A few years ago the only vineyards in the county were in the immediate

vicinity of Fresno City, but lately large tracts of land both north and south have been brought under irrigation and planted in vines.

The vineyards around Minturn and Madera, in the northern part of the county, are devoted almost exclusively to wine growing, while around Fowler, Selma, and Kingsburg on the south, the preference is given to raisins. Appended to this report will be found a complete list of the vine growers of Fresno County, together with the number of acres and varieties of vines planted by each. Had it been practicable I should have made a similar list from the other counties in my district, but the acreage of vines did not warrant the expenditure which would have been required to canvass so large a territory.

TULARE COUNTY.

Tulare County is at last realizing the fact that she has countless acres of fine land well adapted to grape growing, but it is only within the past three years that any important plantations have been made. There are probably eight hundred acres of vines in the county principally in raisin grapes, and as the conditions are similar, her products will undoubtedly equal those of Fresno in excellence.

Kern County also has planted a considerable acreage of vineyard in the past few years, and as a heavy immigration is pouring into the whole San Joaquin Valley, it will be but a short time before the wonderful resources of this county will be more fully developed. Regarding the future of the industry in general, I have no fears. Prices for grapes this season are very low, but I do not believe the depression will be of long duration.

The business of condensing must is in its infancy, and when fully developed will undoubtedly relieve the market of a large part of the surplus crop. Our principal trouble has arisen from the fact that our wines have been marketed too young, but I believe most growers will now hold them until they are properly matured, and sales in the East will be materially increased in consequence.

Respectfully submitted.

GEO. WEST,
Commissioner for the San Joaquin District.

ANNUAL REPORT
OF
L. J. ROSE,
Commissioner for the Los Angeles District, 1887.

LOS ANGELES, August 20, 1887.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I have been unable to give to my district report the personal attention I might wish; but, for want of time and opportunity I have adopted the means recommended and provided for at a recent meeting of the Board, namely: that of employing some competent person in the district to assist in procuring whatever statistics might be available. These I take pleasure in offering. They form a brief but carefully prepared resumé of the present condition of the viticultural industry in the counties over which I have the honor to preside. I trust the same may prove acceptable as submitted herewith.

Very respectfully,

L. J. ROSE,
Commissioner for the Los Angeles District.

L. J. ROSE, *San Gabriel*:

DEAR SIR: At your request I have taken such available statistics as you have furnished, giving the acreage of vines in Southern California, and secured other information from the various counties, and also from the several vine-growing sections, from which I arrive at the inclosed report.

I have found it exceedingly difficult to get any information; the many letters written asking for information remained unanswered. I have interviewed many persons living in different sections of the country, and otherwise arrived at the inclosed report, which I respectfully submit, although with misgivings as to its accuracy.

Yours most obediently,

GEORGE RICE.

Notwithstanding the tendency throughout Southern California to subdivide large tracts into smaller ones, and smaller and some larger ones into lots, I find that the vine interest has not been neglected.

The planting of cuttings last season has been about seventeen per cent of all planted before. The planting has been of the choicest varieties that experience has shown to be the best. Better arrangements for making grapes into wine and brandy have been made and more attention given to details. The grape and wine growers are awake to the importance of the subject, and many expect to continue to make wine and make it most profitable.

The prospect for this year is exceedingly good with every assurance of a full crop. No damage has occurred on account of frost, *coulure*, or other

causes, excepting from some unknown disease that is doing some harm in the neighborhood of Anaheim and Orange, of which I speak further on.

This year's crop will be say ten per cent larger this than last season's, with the exceptions noted. All varieties seem to have done well. The Mission, as usual, loaded, the Zinfandel also continues to bear heavily; the same might be said of all varieties. The Muscat of Alexandria of course excelling in Orange, Santa Ana, and Riverside, and not succeeding along the foothills, where but very few have been planted.

SAN LUIS OBISPO COUNTY.

The planting of cuttings in this county has received quite an impetus the past season, and with better transporting facilities will continue to increase.

The acreage planted in 1885 and prior was	472
Consisting of Zinfandel 84 A., Berger 34, Muscat A. of 31, balance planted to Mission and Malvoisie.	
The planting of 1886-7 was about as follows: Zinfandel 20, Berger 10, Muscat 10, Mission and mixed 40, making.....	80
Total	552

Making an increase of nearly 20 per cent.

SANTA BARBARA COUNTY.

The total acres planted in 1885 and prior amounted to	900
About 35 per cent of this is in Muscat of Alexandria, one half of the remainder in Missions, the balance in Zinfandel, Berger, and scattering European varieties.	
The plant of 1886-7 was	225
Total	1,125

The present outlook is very good, and a full crop assured.

The report from this county was furnished by County Assessor, which he says is as near correct as is possible to give with data before him.

VENTURA COUNTY.

Information from this county was hard to get, more so than from others. From the best information I could get—

The number of acres planted in 1886 and prior was about	380
Planted in 1886-7, 20 per cent increase	76
Total	456

Missions predominating with Zinfandel and Muscats next. A much larger acreage is promised the coming season. "Ventura can make as good wine as can be made in the State," is the language of one of her intelligent citizens.

SAN DIEGO COUNTY.

This county is rallied around the bay, and the people are whooping up the real estate boom. Many beautiful valleys in the interior are awaiting.

Total acres planted 1885 and prior	774
Of this Muscat of Alexandria (raisins)	545
Missions	214
Roussillon type	14
Planting of 1886 7 20 per cent increase; of these 80 per cent were of raisin variety.	
Total acres	1,000

The raisins of El Cajon Valley are pronounced the best in the State; at least, the people of that section so claim, and there is no doubt about their superiority.

SAN BERNARDINO COUNTY.

1885 and prior, planted.....	3,470
Of these Muscat of Alexandria	1,844
Wine varieties make up the balance.	
The increase planted in 1886-7 has been 20 per cent	610
Total	4,080

Of the increase, 80 per cent has been of Muscats—this variety succeeding most admirable, especially at Riverside, where the bulk of all the raisins are grown.

LOS ANGELES COUNTY.

Acres 1885 and prior	15,560
Consisting of Mission and Malvoisie, 30 per cent; Muscat of A., 15 per cent; Zinfandel, 15 per cent; choice European varieties, 40 per cent.	
Planted 1886-7, less loss from disease and subdivision, 10 per cent.	1,560
Total acres	17,120

The disease mentioned appeared noticeable two or three years ago, in Orange and Anaheim, where the vines seem to die without cause. Professor Hilgard thought it must be some climatic trouble that would pass over in a short time.

Entire vines, roots and all, have been sent to scientific men in Washington, D. C., and to others, but no one so far has given a name or remedy.

That no phylloxera exists is certain, but this new disease, whatever it is, should have the attention of your viticultural authorities.

In submitting this report, I do so with misgivings, and you will sympathize with me when you understand the little help I have had, and the number of unanswered letters.

Your most obedient,

GEORGE RICE.

REPORT OF THE SECRETARY.

OFFICE OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS,)
204 MONTGOMERY STREET, SAN FRANCISCO.)

To the Board of State Viticultural Commissioners:

GENTLEMEN: I respectfully report that the duties devolving upon the office of Secretary for the past year have been performed to the best of my ability.

A great many letters have been received from parties seeking information respecting all branches of viticulture, and all of them have been promptly answered or referred to responsible parties who could answer them. As the large planting of vines has been checked for the present, more letters were received from parties wishing to know how they could dispose of their products at a profit than from parties asking information as to what varieties of vines they should plant. It is the wish of the majority of producers that this Commission will devise some plan to help them find a market for their products.

The demand for the reports of the Commission has been a constant one. The supply of Appendices I, II, III to the Second Annual Report of the Chief Executive Officer is nearly exhausted, and I would recommend that a new edition be published, as the information contained in them is so valuable that they will be always in demand. A great many applications for reports have been received from the Eastern States, Mexico, Europe, and Australia. In Australia the reports have been greatly appreciated, and I have just received word that a Board of Viticulture in Victoria has been brought into existence by that Government in a similar way that this Board was created by our Legislature.

During the past year Chief Executive Officer Wheeler has instituted a new plan of sending out appendices to his annual report on subjects of immediate importance to vineyardists. The reports of the Commissioners, as fast as received, were also published and sent out. The mailing of so many pamphlets has greatly increased the work of this office, as our mailing list has increased during the year fully one third, and now contains over six thousand names.

I have devoted considerable time to the compiling of a new directory of grape growers and wine makers of California, and as soon as completed will have it published for distribution. I will then endeavor to obtain the acreage in vines and varieties planted, from each person whose name will appear in the directory.

The gathering of accurate statistics is a very difficult one, owing to the State being so large, and the unwillingness of so many vineyardists to give the information asked for. - During the year 1886, Mr. F. W. Morse, of the State University, was employed by this Commission to gather viticultural statistics. After working several months he obtained very complete statistics from some counties, while from others he obtained but little. During the past year, by order of this Board, each Commissioner was allowed to expend a sum not to exceed \$150, in collecting statistics for his annual report. Some of them used this amount, or part of it, and so added greatly to our statistical information.

In order to obtain accurate information respecting the crop of 1887, I sent out in July a circular to our Inspectors and other persons throughout the State, asking them to answer the following questions:

First—What is the estimated damage to the grape crop by frost?

Second—What is the estimated damage to the grape crop by coulure?

Third—What is the loss by disease or other cause (naming the disease)?

Fourth—How will this year's crop in your vicinity compare with that of 1886, new vineyards included?

Fifth—What varieties will produce a full crop?

Sixth—What varieties will produce a light crop, and why?

To these circulars I received, by August first, one hundred and fifty-one replies, and was able then to estimate the wine crop of 1887 at sixteen million gallons, and the raisin crop at seven hundred and fifty thousand boxes. At the time I made that estimate I was criticised severely by one newspaper for having put the crop so low, but the final result of the vintage did not vary very much from those figures. I shall follow the same plan in the future, and hope by the first of August of each year to be able to give an accurate estimate of that year's crop.

After the passage of the State Pure Wine Bill the work of this office was materially increased, owing to the great number of wine samples received to be analyzed for adulterations. All of the samples, upon receipt, were numbered, and a record of the number, the sender's name, and a description of the wine was kept in this office. The samples were then sent to Prof. W. B. Rising, State Analyst. Upon receipt of the analysis a copy of it was sent to the party sending the sample, and a duplicate of it retained in this office.

EXPERIMENTAL CELLAR.

At the session of the Legislature in 1885 the following appropriation bill was passed:

For viticultural, experimental, scientific, and analytical work, including apparatus and suitable accommodations for the same, under control of the Board of Regents of the State University and the Board of State Viticultural Commissioners, ten thousand dollars.

This appropriation gave this Commission the use of \$2,500 for the year July 1, 1885, to July 1, 1886, and \$2,500 for the year July 1, 1886, to July 1, 1887.

At the same session of the Legislature the office of State Analyst was created, and Professor W. B. Rising, of the State University, was appointed State Analyst. As no appropriation was made for carrying on the work of the State Analyst, the Commissioners decided that the best use they could make of the above money was to carry on analytical work at the office of the State Analyst, and to establish an experimental cellar in this city.

To carry on the analytical work required by this Board the State Analyst was compelled to employ an assistant, and the Board agreed to pay the salary of such assistant, and also to purchase such apparatus as was necessary.

In this city a cellar, situated on the corner of Clay and Leidesdorff Streets, was rented, in which the Commission could store samples of wines from different portions of the State, and also the samples made by this Commission. The cellar was then fitted up, and a committee consisting of Messrs. De Turk, Wetmore, and Krug was appointed to look after the interests of said cellar, and to select suitable wines to be stored in it.

A great many vineyardists throughout the State have of late years been planting new varieties of grapes in order to see the kind of wine that can

be produced from them. Such samples of wines have, in most cases, been sold with the balance of wine in the cellar, or the vineyardist has been financially forced to sell them, and the identity of the wine has therefore become lost. The committee, knowing the value of having such samples stored in this city, where the temperature is uniform throughout the whole year, selected from different portions of the State such samples as they thought would be of interest to keep, in order to show what such wines would be when three, four, or five years old. They obtained a barrel each of *Cabernet* and *Verdot*, *Cabernet* and *Merlot*, *Cabernet* and *Tannat*, *Tannat*, *Petite Syrah*, *Mondeuse*, *Meunier*, *Mataro*, *Carignan*, *Beclan*, *Zinfandel*, *Chauché Noir*, *Petite Pinot*, *Sauterne*, *Johannisberg Riesling*, *Franken Riesling*, *Semillon*, *Chauché Gris*, *Fcher Szagos*, brandy, and port. Most of the wines are of the vintage of 1886, and at the present time are in good condition and improving well. As soon as the wines are ripe enough, they will be clarified and put into bottles.

SHERRY.

To test the values of certain varieties of grapes for sherry, a small room was fitted up, and heated by means of a gas stove, and the temperature kept up to 112° Fahr. Into this room small samples of wines were put and kept there for three months. The varieties put in were *Golden Chasselas*, *Boal*, *Sauvignon Vert*, *Verdelho*, and *West's White Prolific*. Before putting the samples into the hot room, they were all fortified, so as to contain 18 per cent alcohol. The samples are all developing well, especially so the *Golden Chasselas*, *Boal*, and *White Prolific*. In the cellar some *Golden Chasselas* wine was put into barrels, and left to make sherry by the natural way. Being a cool cellar, it has developed very slowly.

The looking after the samples in the cellar, such as racking, ulling, etc., has been a portion of my work, and I have given it all the time I could spare from my duties in this office. To do the rough work, I have employed a man at odd times, paying him \$2 per day for the time he worked. The expenses, therefore, of taking care of the samples has not been very heavy, being \$25 per month for rent of cellar, and from \$6 to \$12 per month for labor.

BRANDY.

To test the value of the *Folle Blanche* grape for brandy purposes, I obtained two hundred pounds of fresh grapes from Mr. S. Osterhout, of Livermore, and fermented them in the back room of the office, and afterward distilled the wine in a small still that belongs to this Commission. The result was a few gallons of excellent brandy of true cognac type, which is now pronounced by all brandy experts as equal to the imported cognac of the same age. The *Folle Blanche* grape can therefore be recommended to all parties wishing to plant a vineyard for the purpose of making a fine brandy of cognac type.

LIBRARY.

I have just completed a catalogue of the books in our library, which same I hand in to be published with this report.

Our library now contains four hundred and twenty-one volumes, consisting of nearly all of the standard works on viticulture and viniculture in the French and English languages. A number of German books will soon be added. No one has been permitted to take books from the office, but all persons have been cordially invited to visit our rooms and make use of

the library during office hours. A great many persons, during the past year, have availed themselves of this privilege.

I also hand in my report on finance, and a copy of the minutes of the meetings held during the year.

Respectfully submitted.

CLARENCE J. WETMORE,
Secretary.

FINANCIAL REPORT.

SAN FRANCISCO, December 31, 1887.

Board of State Viticultural Commissioners:

GENTLEMEN: I respectfully submit the following report of receipts and disbursements for the year ending December 31, 1887, as taken from the books in this office:

Receipts.

Balance unexpended December 31, 1886	\$7,250 88	
Appropriation for the fiscal year ending July 1, 1888	15,000 00	
		\$22,250 88

Disbursements.

Office expenses	\$3,146 76	
Salaries of Chief Executive Officer and Secretary	3,583 32	
Experimental work	222 01	
Reports	25 84	
Traveling expenses Chief Executive Officer	72 65	
Traveling expenses Commissioners	111 90	
Expenses of conventions	396 50	
Library	143 00	
Work done outside of State	600 48	
Distributing information	235 25	
Experimental cellar	1,352 69	
Expenses office of State Analyst	607 35	
Statistics	481 80	
		\$10,979 55
Balance unexpended		\$11,271 33

CLARENCE J. WETMORE,
Secretary.

SESSIONS OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS.

OFFICE OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS. }
204 MONTGOMERY STREET, SAN FRANCISCO, January 15, 1887. }

A special meeting of the Board was held on the above date, and was called to order at eleven o'clock A. M., by President Haraszthy. The following Commissioners were present: Haraszthy, Wetmore, Krug, Shorb, DeTurk, and West, and Secretary J. H. Wheeler.

Under the head of correspondence, a communication was read from Jas. H. Reall, President of the National Agricultural and Dairymen's Association, addressed to Commissioner Wetmore, as one of the committee appointed

be produced from them. Such samples of wines have, in most cases, been sold with the balance of wine in the cellar, or the vineyardist has been financially forced to sell them, and the identity of the wine has therefore become lost. The committee, knowing the value of having such samples stored in this city, where the temperature is uniform throughout the whole year, selected from different portions of the State such samples as they thought would be of interest to keep, in order to show what such wines would be when three, four, or five years old. They obtained a barrel each of *Cabernet* and *Verdot*, *Cabernet* and *Merlot*, *Cabernet* and *Tannat*, *Tannat*, *Petite Syrah*, *Mondeuse*, *Meynier*, *Mataro*, *Carignan*, *Beclan*, *Zinfandel*, *Chauché Noir*, *Petite Pinot*, *Sauterne*, *Johannisberg Riesling*, *Franken Riesling*, *Semillon*, *Chauché Gris*, *Feher Szagos*, brandy, and port. Most of the wines are of the vintage of 1886, and at the present time are in good condition and improving well. As soon as the wines are ripe enough, they will be clarified and put into bottles.

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The looking after the samples in the cellar, such as racking, ulling, etc., has been a portion of my work, and I have given it all the time I could spare from my duties in this office. To do the rough work, I have employed a man at odd times, paying him \$2 per day for the time he worked. The expenses, therefore, of taking care of the samples has not been very heavy, being \$25 per month for rent of cellar, and from \$6 to \$12 per month for labor.

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the library during office hours. A great many persons, during the past year, have availed themselves of this privilege.

I also hand in my report on finance, and a copy of the minutes of the meetings held during the year.

Respectfully submitted.

CLARENCE J. WETMORE,
Secretary.

FINANCIAL REPORT.

SAN FRANCISCO, December 31, 1887.

Board of State Viticultural Commissioners:

GENTLEMEN: I respectfully submit the following report of receipts and disbursements for the year ending December 31, 1887, as taken from the books in this office:

Receipts.

Balance unexpended December 31, 1886	\$7,250 88	
Appropriation for the fiscal year ending July 1, 1888	15,000 00	
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Statistics	481 80	
		\$10,979 55
Balance unexpended		\$11,271 33

CLARENCE J. WETMORE,
Secretary.

SESSIONS OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS.

OFFICE OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS, }
204 MONTGOMERY STREET, SAN FRANCISCO, January 15, 1887. }

A special meeting of the Board was held on the above date, and was called to order at eleven o'clock A. M., by President Haraszthy. The following Commissioners were present: Haraszthy, Wetmore, Krug, Shorb, DeTurk, and West, and Secretary J. H. Wheeler.

Under the head of correspondence, a communication was read from Jas. H. Reall, President of the National Agricultural and Dairymen's Association, addressed to Commissioner Wetmore, as one of the committee appointed

OFFICE OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS, }
 204 MONTGOMERY STREET, SAN FRANCISCO, February 14, 1887. }

An adjourned meeting of the Board was held on the above date, for the purpose of considering the resignation of the Chief Executive Officer.

There being no quorum present, the meeting was then adjourned to March 8, 1887.

J. H. WHEELER,
 Secretary.

OFFICE OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS, }
 204 MONTGOMERY STREET, SAN FRANCISCO, March 8, 1887. }

An adjourned meeting of this Commission was called to order by the President, on the above date, at half-past one o'clock p. m. The following Commissioners were present: Messrs. Haraszthy, Shorb, Krug, West, Wetmore, and Manlove.

On motion of Mr. Wetmore, the Secretary was instructed to forward resolutions of sympathy and regret to the relatives of the late Louis Grandjean, who has, for some time past, acted as assistant to the State Analyst.

On motion of Mr. West, the Secretary was instructed to extend a vote of thanks to Senator L. J. Rose, for the able assistance rendered the viticultural industry by him at the present Legislature. Also, that the Secretary tender the acknowledgment of the Board to Mr. B. F. Clayton, for work performed by him at Washington, and for the general interest that he has developed in California viticulture throughout the East in his efforts made in behalf of the sweet wine measure.

The following resolution was then offered by Mr. Shorb, and unanimously carried :

Resolved, That the action of Hon. C. N. Felton, together with the entire delegation of California in Congress, in refusing to accept the Conference Committee report on the Sweet Wine Bill, is hereby commended, and that the thanks of our vine growers should be tendered for the jealous watchfulness of our interests.

President Haraszthy was appointed a committee of one to communicate to the Grape Growers and Wine Makers' Convention, now in session, the action already taken by this Board relative to the London Exhibition, with the request that the association now take the matter in hand to conduct a California exhibit as they may see fit.

The resignation of the Chief Executive Officer was then considered, and by resolution adopted made a special order for a meeting to be held the following day, March 9, 1887, at eleven o'clock a. m., and Messrs. Haraszthy, Shorb, and Krug were appointed a special committee to report on the subject.

Adjourned.

J. H. WHEELER,
 Secretary.

OFFICE OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS, }
 204 MONTGOMERY STREET, SAN FRANCISCO, March 9, 1887. }

The adjourned meeting of the Board was called to order by the President, at eleven o'clock a. m. Present—Commissioners Haraszthy, Wetmore, Krug, Shorb, West, and Manlove.

A communication was read from Mr. DeTurk, at this time in the East, asking that an Auditor be appointed to serve in his absence. The President appointed Dr. W. S. Manlove.

On motion of Mr. Krug, the Secretary was instructed to prepare a resolution of thanks to Assemblyman Coombs, Chairman of the Assembly Viticultural Committee at the last Legislature, for services rendered to viticultural interests.

The special committee appointed at the meeting yesterday to consider the matter of the resignation of Mr. Wetmore, as Chief Executive Officer, here presented their report, which read as follows:

Resolved, That the State Board of Viticulture accept with most profound regret the resignation of its Chief Executive Viticultural Officer, Charles A. Wetmore; that a vote of appreciative confidence and thanks is hereby tendered to Mr. Wetmore for his untiring energy, his unflinching zeal and enthusiasm, for his unselfish and single-minded purpose in promoting the best welfare of viticulture in California. That we have ever found him a faithful, conscientious, hard working, and efficient officer, and that to him more than to any one else is due the present high standard of excellence and widespread good reputation of our California wines. That in his resignation we see a public calamity to the best interests of our State, and especially to the whole immediate future development of viticulture in California.

ARPAD HARASZTHY,
J. DEBARTH SHORB,
CHARLES KRUG,
Committee.

The report of the committee was accepted by a unanimous vote, and the Secretary was specially directed to enter the same in full on the minutes.

In response, Mr. Wetmore thanked the members of the Board for the liberal assistance they had given him in the administration of the duties of his office, and made especial reference to the deep gratitude he felt for the marked unanimity of their support.

The resignation of J. H. Wheeler, as Secretary of the Board, was then read and accepted, and Clarence J. Wetmore was elected by unanimous vote in his stead.

Mr. West then nominated Mr. J. H. Wheeler for Chief Executive Officer of the Board. There being no other nominations, Mr. Wheeler was unanimously elected.

Mr. Wetmore moved the establishment of a viticultural station at Mr. H. W. Crabb's vineyard, in Napa County, for the special propagation of and experimentation with new varieties of grapes for the determination of their value. Also for testing the value of certain resistant stocks, and also that Mr. Crabb be appointed to superintend such station and work. Seconded by Mr. Krug, and carried.

The President then appointed Dr. W. S. Manlove, who was appointed as Commissioner vice R. B. Blowers, on the Committee on Vine Pests and Diseases of the Vine, and also on the Committee on Raisins and Table Grapes.

The action taken yesterday in appointing President Haraszthy a committee of one to confer with the Vine Growers and Wine Makers' Convention, relative to the London Exhibition, was reconsidered, and the following committee was appointed to confer with the railroad companies, requesting their coöperation in the matter of a California exhibit of viticultural products at the coming London Exhibition: Messrs. Manlove, Wetmore, and Haraszthy.

President Haraszthy then announced a call for the yearly reports of the Commissioners, and said that he should expect them to be handed in on or before the next regular meeting of the Board, to be held in June.

OFFICE OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS,)
 204 MONTGOMERY STREET, SAN FRANCISCO, February 14, 1887.)

An adjourned meeting of the Board was held on the above date, for the purpose of considering the resignation of the Chief Executive Officer.

There being no quorum present, the meeting was then adjourned to March 8, 1887.

J. H. WHEELER,
 Secretary.

OFFICE OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS,)
 204 MONTGOMERY STREET, SAN FRANCISCO, March 8, 1887.)

An adjourned meeting of this Commission was called to order by the President, on the above date, at half-past one o'clock P. M. The following Commissioners were present: Messrs. Haraszthy, Shorb, Krug, West, Wetmore, and Manlove.

On motion of Mr. Wetmore, the Secretary was instructed to forward resolutions of sympathy and regret to the relatives of the late Louis Grandjean, who has, for some time past, acted as assistant to the State Analyst.

On motion of Mr. West, the Secretary was instructed to extend a vote of thanks to Senator L. J. Rose, for the able assistance rendered the viticultural industry by him at the present Legislature. Also, that the Secretary tender the acknowledgment of the Board to Mr. B. F. Clayton, for work performed by him at Washington, and for the general interest that he has developed in California viticulture throughout the East in his efforts made in behalf of the sweet wine measure.

The following resolution was then offered by Mr. Shorb, and unanimously carried:

Resolved, That the action of Hon. C. N. Felton, together with the entire delegation of California in Congress, in refusing to accept the Conference Committee report on the Sweet Wine Bill, is hereby commended, and that the thanks of our vine growers should be tendered for the jealous watchfulness of our interests.

President Haraszthy was appointed a committee of one to communicate to the Grape Growers and Wine Makers' Convention, now in session, the action already taken by this Board relative to the London Exhibition, with the request that the association now take the matter in hand to conduct a California exhibit as they may see fit.

The resignation of the Chief Executive Officer was then considered, and by resolution adopted made a special order for a meeting to be held the following day, March 9, 1887, at eleven o'clock A. M., and Messrs. Haraszthy, Shorb, and Krug were appointed a special committee to report on the subject.

Adjourned.

J. H. WHEELER,
 Secretary.

OFFICE OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS,)
 204 MONTGOMERY STREET, SAN FRANCISCO, March 9, 1887.)

The adjourned meeting of the Board was called to order by the President, at eleven o'clock A. M. Present—Commissioners Haraszthy, Wetmore, Krug, Shorb, West, and Manlove.

A communication was read from Mr. DeTurk, at this time in the East, asking that an Auditor be appointed to serve in his absence. The President appointed Dr. W. S. Manlove.

On motion of Mr. Krug, the Secretary was instructed to prepare a resolution of thanks to Assemblyman Coombs, Chairman of the Assembly Viticultural Committee at the last Legislature, for services rendered to viticultural interests.

The special committee appointed at the meeting yesterday to consider the matter of the resignation of Mr. Wetmore, as Chief Executive Officer, here presented their report, which read as follows:

Resolved, That the State Board of Viticulture accept with most profound regret the resignation of its Chief Executive Viticultural Officer, Charles A. Wetmore; that a vote of appreciative confidence and thanks is hereby tendered to Mr. Wetmore for his untiring energy, his unflinching zeal and enthusiasm, for his unselfish and single-minded purpose in promoting the best welfare of viticulture in California. That we have ever found him a faithful, conscientious, hard working, and efficient officer, and that to him more than to any one else is due the present high standard of excellence and widespread good reputation of our California wines. That in his resignation we see a public calamity to the best interests of our State, and especially to the whole immediate future development of viticulture in California.

ARPAD HARASZTHY,
J. DEBARTH SHORB,
CHARLES KRUG,
Committee.

The report of the committee was accepted by a unanimous vote, and the Secretary was specially directed to enter the same in full on the minutes.

In response, Mr. Wetmore thanked the members of the Board for the liberal assistance they had given him in the administration of the duties of his office, and made especial reference to the deep gratitude he felt for the marked unanimity of their support.

The resignation of J. H. Wheeler, as Secretary of the Board, was then read and accepted, and Clarence J. Wetmore was elected by unanimous vote in his stead.

Mr. West then nominated Mr. J. H. Wheeler for Chief Executive Officer of the Board. There being no other nominations, Mr. Wheeler was unanimously elected.

Mr. Wetmore moved the establishment of a viticultural station at Mr. H. W. Crabb's vineyard, in Napa County, for the special propagation of and experimentation with new varieties of grapes for the determination of their value. Also for testing the value of certain resistant stocks, and also that Mr. Crabb be appointed to superintend such station and work. Seconded by Mr. Krug, and carried.

The President then appointed Dr. W. S. Manlove, who was appointed as Commissioner vice R. B. Blowers, on the Committee on Vine Pests and Diseases of the Vine, and also on the Committee on Raisins and Table Grapes.

The action taken yesterday in appointing President Haraszthy a committee of one to confer with the Vine Growers and Wine Makers' Convention, relative to the London Exhibition, was reconsidered, and the following committee was appointed to confer with the railroad companies, requesting their coöperation in the matter of a California exhibit of viticultural products at the coming London Exhibition: Messrs. Manlove, Wetmore, and Haraszthy.

President Haraszthy then announced a call for the yearly reports of the Commissioners, and said that he should expect them to be handed in on or before the next regular meeting of the Board, to be held in June.

On motion of Mr. Krug, each Commissioner was allowed to incur an expense not to exceed \$150 in procuring statistics for said report.

Mr. Haraszthy announced that he would endeavor to present, as Commissioner at Large, a report on the increase and aggregate values of products and properties other than direct investment in lands, vines, and first planting of vineyards, that have developed by the viticultural industry in California. He also announced that he should call upon Mr. Shorb, the other Commissioner at Large, for a report on the influence of the development of viticulture on the real estate values of the State.

The meeting then adjourned.

J. H. WHEELER,
Secretary.

OFFICE OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS, }
204 MONTGOMERY STREET, SAN FRANCISCO, June 13, 1887. }

The regular semi-annual meeting of the Board was called to order on the above date, at eleven o'clock A. M., by President Haraszthy. The following Commissioners were present: Messrs. Haraszthy, Wetmore, DeTurk, Krug, and Manlove.

The minutes of the previous meetings were read and approved.

A communication from Dr. J. A. Bauer to Chief Executive Officer Wheeler was then read. The communication contained an account of his success with the mercurial remedy for destroying the phylloxera. The communication was received and placed on file, and Mr. Krug was appointed a committee of one to examine this experimental plot in Mr. Hagen's vineyard, and to request Mr. H. W. Crabb and the Chief Executive Officer to accompany him, to verify the truth of the above report. The Chief Executive Officer was also instructed to visit the experimental plot treated by the Commission in Sonoma with the mercurial remedy, and to report the success to the Commission at its next meeting.

Mr. Wetmore reported that in some places in the south the vines were dying with sunstroke, the same disease that he had reported on last year.

The Chief Executive Officer reported that he had received a great many letters about various insect pests doing more or less damage to the grapevines; also, that he had made experiments at Crabb's Station with Paris green and arsenic, to determine how much could be used without injury to the vines and the fruit. The report on the same will be made later.

Mr. Wheeler then read a letter from Mr. Arthur Rodgers, Regent of the State University, asking what help the Commission would want from the Regents of the University in reference to aiding the State Analyst. Prof. W. B. Rising, being present, reported that his office was being crowded with samples to be tested for purity, and that in order to finish them up without delay he needed more help.

On motion, Professor Rising was requested to make out an estimate of the expenses of his office for the next year, and that he and the Chief Executive Officer confer with the Board of Regents of the State University and see what they will be willing to do, and to report the same to the Executive Committee of this Commission as soon as possible.

Dr. W. S. Manlove then offered the following resolution, which was unanimously adopted:

Resolved, That the Chief Executive Officer be instructed to issue a circular to Local Resident Inspectors throughout the State, calling upon them to report promptly whenever they discover any violations of the Pure Wine Law in the use of materials forbidden by that law in the manufacture of wines sold as pure.

Mr. Haraszthy, from the committee appointed at the last meeting to confer with the railroad companies in reference to the London Exhibition, reported that he had conferred with the managers of the Southern Pacific, and requested the Secretary to read the following letter which he had received:

NEW YORK, May 4, 1887.

ARPAD HARASZTHY, *President State Viticultural Commission, San Francisco, California:*

DEAR SIR: Yours of the twenty-sixth ultimo is received relative to the participation of your Commission in any representation which may be made by this company through Major Truman at the London Exposition.

In answer I will say that it is not definitely determined to send Major Truman to London on that business, but if any one goes it will be he. There have been, from time to time, doubts in circulation as to whether the Exposition would be a success or a failure, and it may require him to go over and see for himself before embarking much money in the venture.

We shall not make any exhibit of California products ourselves, and if we appear there at all it will be a sort of missionary work to make known the advantages of California, in order that we may derive some indirect benefit from it by the attractions for settlers and tourists. The outlay will be certain, but the returns will be conjectural. However, if we conclude to go any further in the matter, we agree with you that the Major would be as good a representative as we could find, and his connection with the railroad companies would help rather than hinder his efforts to serve your association. I suppose it will be proper in that event that the association should bear a certain proportion of his expenses outside of the printing which each interest would provide at its own expense. On this basis there would be no objection to coöperation.

Yours, very respectfully,

C. P. HUNTINGTON,
Vice-President.

On motion the communication was placed on file.

Mr. Wetmore then offered the following resolution, which was seconded by Mr. Krug, and unanimously adopted:

Resolved, That the Secretary be instructed to call upon Miss Kate Field and present the thanks of the vine growers for the lively interest she has shown in the development of legitimate American wine industries, and to confer with her with a view to securing further active work in popularizing, throughout the Eastern States, correct information concerning the rational use of wine.

In regard to the damage done by frost, Mr. DeTurk reported that in his section the frost had skipped about considerably and had done some damage. In Green Valley the frost had done no damage; also, the vineyards about Cloverdale were not injured. Near Santa Rosa, Glen Ellen, and in Los Guilicos Valley, the vines had been damaged to a considerable extent.

Dr. Manlove, Commissioner for the Sacramento District, reported that the frost had done a great deal of damage to some of the vineyards in his district, but that the Natoma Vineyard had escaped, owing to the smoking of the vineyard.

Mr. Krug, from the Napa District, reported that his Rieslings, trained on wires, had suffered a great deal from the frost, and that where he got last year twelve to thirteen tons to the acre, he would not get three tons this year. He considered that Napa Valley was good for two thirds of a crop this year.

Estimates were then made as to the total amount of wine that would be made in the State, and they varied from fifteen million to twenty-two million gallons.

The last Legislature failing to make any appropriation for analytical and experimental work, the Commission decided to keep on with its work at the experimental cellar, and to pay the expenses of the same out of the regular appropriation of the Board. The President then appointed Messrs. DeTurk, Wetmore, and Krug, a special committee to select wines from different portions of the State to be put in the experimental cellar for aging.

The election of officers for the ensuing year then took place, resulting as follows: President, Arpad Haraszthy; Vice-President, Chas. A. Wetmore; Treasurer, Chas. Krug; Secretary, Clarence J. Wetmore; Chief Executive Officer, J. H. Wheeler.

The President then appointed the following committees: Executive Committee, DeTurk, West, and Manlove; Auditing Committee, Dr. W. S. Manlove; Finance Committee, Rose and Shorb; Vine Pests and Diseases of the Vine, DeTurk, West, and Manlove; To Confer with the Board of Regents, Haraszthy, Wetmore, and Krug; Distillation, Counterfeits, and Adulterations, Shorb, West, and Krug; Raisin and Table Grapes, West, Rose, and Manlove; Instructions for Office of Chief Executive Officer, Haraszthy, Krug, and DeTurk; Compensation to be Paid Chief Executive Officer, Krug, DeTurk, and West.

The meeting then adjourned.

CLARENCE J. WETMORE,
Secretary.

OFFICE OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS, }
204 Montgomery Street, San Francisco, December 12, 1887.

The regular semi-annual meeting of the Board was called to order on the above date at eleven o'clock A. M., Arpad Haraszthy in the chair. The following Commissioners were present: Messrs. Haraszthy, Krug, DeTurk, Rose, and West.

Minutes of the previous meeting were read and approved.

Commissioner Krug, Chairman of the committee appointed at the last meeting to examine the vineyard of Mr. Hagen, at Napa, and to report on the Bauer mercurial remedy, reported that he had made an examination of the vineyard, in company with Dr. H. W. Crabb and the Chief Executive Officer, and that they had found that the remedy was a complete failure. He also reported that the Riparia vines in that vineyard were doing remarkably well; that the Lenoir were doing fairly well, and the California poorly.

The Chief Executive Officer reported that he had written a letter to the Board of Regents, asking that body to render some assistance towards paying the expenses of the State Analyst, but that he had received no answer to it. Also, that he had sent out, as directed, a circular letter to the Inspectors, asking them to report any violations of the Pure Wine Law that came under their observation, and that so far he had received no reports.

The following letter was then read from Senator George Hearst:

SAN FRANCISCO, October 22, 1887.

ARPAD HARASZTHY, Esq., President State Board of Viticulture, San Francisco, California:

DEAR SIR: The time of meeting of the Fiftieth Congress is rapidly approaching, and such measures as it is desirable to bring before that body should be ready for introduction at an early date of the session. I am desirous of receiving such suggestions from your Board as will enable me to assist in supporting any legislation required by the viticultural interests of this coast. I shall feel under obligations if you will indicate in what way those interests may be subserved by Congress. Please accompany such suggestions with such statistics and other information as will aid in the accomplishment of the desired results. If there are any special measures you desire introduced, I shall take pleasure in introducing them, or in seconding the efforts of others who may be selected to do so. Please furnish me with your annual reports for the past three or four years, and any other documents which you may have bearing upon the viticulture of the State.

I am very respectfully,

GEORGE HEARST.

On motion, the letter was placed on file.

A communication was then read from Commissioner Wetmore, offering many valuable suggestions on national legislation required for the viticultural industry. These suggestions were discussed at great length, and from them the following resolutions were finally adopted by a unanimous vote of the Board:

1. *Resolved*, That any decrease in the tariff on imported wines and brandies would be detrimental to our industry and should be vigorously opposed.

2. *Resolved*, That it is the sense of this Board that the wine makers of the United States, producing sweet wines, should be permitted the use of grape spirits, free of tax, for that purpose, but that no other than grape spirit should be permitted in the manufacture of such sweet wines without paying the usual tax.

3. *Resolved*, That all fruit juices compounded with alcohol, be classed as alcoholic compounds and taxed as such, and that a special effort to secure a revision of the tariff in this respect should be made without delay.

4. WHEREAS, The bonding period of three years has been found entirely inadequate to the necessities of maturing our brandies and finding a market for the same; and, further, that it being entirely impossible to know in advance the varying requirements of trade regarding the capacity of casks; therefore, be it

Resolved, That we petition our Senators and Representatives in Congress to secure for us a bonding period to extend to five years, and the privilege of breaking packages in bond, under proper regulations, into such sizes as the trade may require.

5. *Resolved*, That this Commission indorse the spirit and intention of the Pure Wine Bill, introduced by Hon. Wharton J. Green, of North Carolina, at the last session of Congress, and if any bill to protect genuine wines is to be presented this session, it should be in conformity with that bill.

6. *Resolved*, That the present tariff on raisins is too low to permit, in ordinary years of large importations, fair competition of American producers against the products of chief foreign labor, and that the former resolutions of this Board, urging Congress to increase the tariff in this respect, be reiterated. Also, that our Senators and Representatives be requested to use their influence to resist any attempt to reduce the same.

7. *Resolved*, That the Secretary of this Board be hereby instructed to forward a copy of these resolutions to Senator Hearst and to the other members of the California Delegation at Washington.

The following resolution, offered by Mr. Krug, was unanimously adopted:

Resolved, That in the present ruling of the Supreme Court in the case of *People vs. Kohler*, a test case to determine the validity of the Pure Wine Law, this Board finds cause for regret in that the beneficial effects expected from that law, in protecting the purity of California wines, were frustrated by the decision of the said Supreme Court on account of a construed miswording of said law.

Section 8 of said law reads as follows: "It is desired and required that all and every grower, manufacturer, trader, handler, or bottler of California wines, when selling or putting up for sale any California wine, or when shipping California wine to parties to whom sold, shall plainly stencil, brand, or have printed where it will be easily seen, first, 'Pure California Wine,' and secondly, his name or the firm's name, as the case may be, both on label of bottle or package in which wine is sold and sent; or he may, in lieu thereof, if he so prefers and elects, affix the label which has been provided for in Section 7."

Now, whereas, we recognize that there may be just grounds for the ruling of the Supreme Court in deciding that this clause may not be considered mandatory, yet we believe that a liberal construction, based upon the ordinary understanding of this portion of Section 8, would make it mandatory, conformant to what we know to have been the intention of the framers of said law; further, that the Board agrees that the purity of California wines can only be protected by the passage of a national wine law.

On motion of Mr. Rose, the Commission decided to hold a State Convention in the spring, and the time and arrangements for the same were left to the President and the Chief Executive Officer.

A letter was then read from Dr. E. J. Fraser, asking the Commissioners to examine some samples of wine treated with electro-magnetism, and to report on the same. The President appointed the following committee to examine the wines: Messrs. Rose, DeTurk, and West. This committee examined the wines and requested Dr. Fraser to present samples to the wine committees which will be appointed at the next Convention.

The meeting then adjourned.

CLARENCE J. WETMORE,
Secretary.

CATALOGUE OF BOOKS IN LIBRARY OF THE STATE VITI- CULTURAL COMMISSION.

No.	Title of Book.	Author.
1	Pomologie Générale, tome 1	A. Mas.
2	Pomologie Générale, tome 2	A. Mas.
3	Pomologie Générale, tome 3	A. Mas.
4	Pomologie Générale, tome 4	A. Mas.
5	Pomologie Générale, tome 5	A. Mas.
6	Pomologie Générale, tome 6	A. Mas.
7	Pomologie Générale, tome 7	A. Mas.
8	Pomologie Générale, tome 8	A. Mas.
9	Pomologie Générale, tome 9	A. Mas.
10	Pomologie Générale, tome 10	A. Mas.
11	Pomologie Générale, tome 11	A. Mas.
12	Pomologie Générale, tome 12	A. Mas.
13	Le Verger, tome 1	M. Mas.
14	Le Verger, tome 2	M. Mas.
15	Le Verger, Part I, tome 3	M. Mas.
16	Le Verger, Part II, tome 3	M. Mas.
17	Le Verger, tomes 4 and 5	M. Mas.
18	Le Verger, tome 6	M. Mas.
19	Le Verger, tome 7	M. Mas.
20	Le Verger, tome 8	M. Mas.
21	Le Vignoble, tome 1	Mas and Pulliat.
22	Le Vignoble, tome 2	Mas and Pulliat.
23	Le Vignoble, tome 3	Mas and Pulliat.
24	Encyclopédie de L'Agriculteur, tome 1	
25	Encyclopédie de L'Agriculteur, tome 2	
26	Encyclopédie de L'Agriculteur, tome 3	
27	Encyclopédie de L'Agriculteur, tome 4	
28	Encyclopédie de L'Agriculteur, tome 5	
29	Encyclopédie de L'Agriculteur, tome 6	
30	Encyclopédie de L'Agriculteur, tome 7	
31	Encyclopédie de L'Agriculteur, tome 8	
32	Encyclopédie de L'Agriculteur, tome 9	
33	Encyclopédie de L'Agriculteur, tome 10	
34	Encyclopédie de L'Agriculteur, tome 11	
35	Encyclopédie de L'Agriculteur, tome 12	
36	Encyclopédie de L'Agriculteur, tome 13	
37	Maison Rustique du XIX Siècle, tome 1	
38	Maison Rustique du XIX Siècle, tome 2	
39	Maison Rustique du XIX Siècle, tome 3	
40	Maison Rustique du XIX Siècle, tome 4	
41	Maison Rustique du XIX Siècle, tome 5	
42	Etude des Vignobles de France, tome 1	J. Guyot.
43	Etude des Vignobles de France, tome 2	J. Guyot.
44	Etude des Vignobles de France, tome 3	J. Guyot.
45	Viticulture de l'est de la France	J. Guyot.
46	Viticulture du sud-ouest de la France	J. Guyot.
47	Culture de la Vigne	J. Guyot.
48	Guide du Fabricant d'Alcools, tome 1	N. Bassett.
49	Guide du Fabricant d'Alcools, tome 2	N. Bassett.
50	Guide du Fabricant d'Alcools, tome 3	N. Bassett.
51	La Fermentation	N. Bassett.
52	De la Culture des Vignes dans le Médoc	A. D'Armailhacq.
53	La Vigne	Petit-Lafitte.
54	Traitement des Vins, tome 1	R. Boireau.
55	Traitement des Vins, tome 2	R. Boireau.
56	Culture de la Vigne	R. Boireau.
57	Viticulture et Œnologie, tome 1	C. Ladrey.
58	Viticulture et Œnologie, tome 2	C. Ladrey.
59	L'Art de Faire le Vin	C. Ladrey.
60	Le Phylloxera	C. Ladrey.
61	Traite de Vinification	L. F. Dubief.
62	Trésor des Vignerons	L. F. Dubief.
63	La Fermentation des Vins	Le Gentil.

CATALOGUE OF BOOKS—Continued.

No.	Title of Book.	Author.
64	Génération des Ferments.....	E. Fremy.
65	Culture de la Vigne.....	A. Lenoir.
66	Les Vignobles.....	A. Dubreuil.
67	Le Vigneron Provençal.....	A. Pellicot.
68	Travail des Vins.....	E. J. Maumené.
69	Etudes sur les Fermentations.....	A. Gautier.
70	La Sophistication des Vins.....	A. Gautier.
71	Statistique de la Vigne.....	Morelot.
72	Œnologie Française.....	Cavoleau.
73	Entre Vignerons a la Veillée.....	M. Daguillon.
74	Culture du Médoc.....	A. Joubert.
75	Les Vins.....	A. Joubert.
76	La Vigne en Chaintres.....	H. Hemmer.
77	Le Mildiou.....	Foex et Viala.
78	Submersion des Vignes.....	T. Ambroy.
79	Plants Américains.....	E. Courty.
80	Maladies de la Vigne.....	Serigne.
81	Manuel de Viticulture.....	G. Foex.
82	Culture du Chasselas.....	R. Charmeux.
83	Guide du Vigneron.....	F. Lucoste.
84	Maladie de la Vigne.....	Bouchardat.
85	L'Art de Greffer.....	Ch. Baltet.
86	De l'Action du Froid.....	Ch. Baltet.
87	Arboriculture, Fruitière, et Viticulture.....	Ch. Baltet.
88	Chauffage des Vins.....	Giret et Vinas.
89	L'Art de Faire le Vin.....	Chaptal.
90	L'Art de Faire le Vin.....	A. B.
91	L'Art de Faire le Vin avec les Raisins Secs.....	J. Audibert.
92	Les Raisins Secs.....	J. Audibert.
93	St. Emilion et ses Vins.....	Cocks et Feret.
94	Manuel des Vins.....	E. Robinet.
95	Analyse des Vins.....	E. Robinet.
96	Le Vin.....	Verguettes-Lamotte.
97	Le Vin.....	
98	Du Vin.....	C. Husson.
99	Méthode de Vinification.....	Aubergier.
100	Les Vins Exotiques.....	R. Sempé.
101	Fraudes et Maladies du Vin.....	J. Brun.
102	Fabrication des Liquers.....	Tondeur.
103	Fabricator des Liquers, tome I.....	P. Duplais.
104	Fabricator de Liquers, tome II.....	P. Duplais.
105	Vin de Bordeaux.....	P. Carles.
106	Viticulture de L'Anjou.....	E. Borit.
107	Les Ravageurs des Vergers et des Vignes.....	La Blanchère.
108	La Vigne et le Vin.....	Burdal.
109	Culture de la Vigne dans la Cote-D'Or.....	E. Cornu.
110	La Lutte contre le Phylloxera.....	J. A. Barral.
111	Le Phylloxera.....	Mouillefert.
112	Culture de la Vigne Américaine.....	
113	Les Vignes Américaines.....	
114	Les Vignes Américaines.....	
115	Manuel du Négociant.....	Francois.
116	Culture du Chasselas.....	Roret.
117	Eaux et Boissons Gazeuses.....	Roret.
118	Calendrier des Vins.....	Roret.
119	Culture de la Vigne.....	Roret.
120	Négociant d'Eau de Vie.....	Roret.
121	Distillation des Vins.....	Roret.
122	Amélioration des Liquides.....	Roret.
123	Fabricant de Cidre.....	Roret.
124	Fabricant de Levure.....	Roret.
125	Fabrication des Engrais.....	Roret.
126	Manuel d'Alcoométrie.....	Roret.
127	Manuel du Distillateur.....	Roret.
128	Manuel du Sommelier.....	Roret.
129	Manuel du Tonnelier.....	Roret.
130	Manuel du Vinaigrier.....	Roret.
131	Manuel du Vigneron.....	Roret.
132	Monographie des Greffes.....	Roret.

CATALOGUE OF BOOKS—Continued.

No.	Title of Book.	Author.
133	Les Vignes Américaines	Millardet.
134	Culture de la Vigne	Persoz.
135	Le Parfait Maître de Chai	Peyroux.
136	Théorie des Pèse Liqueurs	Benoit.
137	Conseiller du Débitant de Boissons	Du Liège.
138	Quatre Ans de Luttés pour nos Vignes et nos Vins	P. De Lafitte.
139	La Distillation	H. Déon.
140	Manuel de la Distillation	C. Stammer.
141	Manuel des Distilleries	J. Péroche.
142	De l'Alcool	P. Jaillet.
143	Fabrication de l'Alcool	J. Paul Roux.
144	La Question du Vinage	H. Messine.
	Guide du Vigneron	Crolas.
	Contre le Phylloxera	Vermorel.
	La Pulvérisation	P. Guyot.
	Etudes sur les Boissons Fermentées	M. Bouchérié.
	Le Vin dans la Soloque	E. Burdel.
	Soins à Donner aux Vins Fins de la Cote-D'Or	Seguin-Roland.
145	Sur la Viticulture de la Charente-Inférieure	J. Guyot.
	Plantation et Culture de la Vigne	A. Desvignes.
	Formation des Végétaux	Chavée-Leroy.
	Vins Sophistiqués	E. Bastide.
	La Vigne et son Phylloxère	N. Bassett.
	Maladie de la Vigne	Delfau.
	La Gelée des Vignes	A. Desforges.
146	Fouloirs, Pompes, Pressoirs	De Martin.
147	Le Greffeur de Vignes	V. Pulliat.
148	La Vigne	Bertall.
149	Histoire des Insectes Nuisible a la Vigne	Andouin.
150	Etudes sur le Phylloxera Vastatrix	Cornu.
151	Observations sur le Phylloxera	
	Etudes sur les Péronosporées	Cornu.
	Etudes sur la Nouvelle Maladie de la Vigne	
152	Mémoire sur les Moyens de Combattre l'Invasion du Phylloxera	Dumas.
153	Indications Générales sur les Vignobles des Charente	Girard.
	Mémoire sur la Reproduction du Phylloxera du Chêne	Balbani.
	Rapport Général sur le Phylloxera	Destremx.
154	Recherches sur le Phylloxera Vastatrix	Institute de France.
155	Commission du Phylloxera	Institute de France.
156	Traitement des Vignes Phylloxérées par le Sulfure de Carbon	Marion.
	Le Phylloxera et les Cultures Profondes	Ibarrart.
	Rapport sur le Phylloxera	Lefranc.
157	Rapport sur le Phylloxera	Marion.
	Rapport sur le Phylloxera	Dumas.
	Rapport sur le Phylloxera	Saint-Supery.
158	Commission Supérieure du Phylloxera, 1881	
159	Commission Supérieure du Phylloxera, 1885	
160	Phylloxera—Commission Departmentale de l'Herault	
	Manuel et Calendrier Phylloxériques a l'usage des Vignerons de Champagne	Vimont.
	Maladies de la Vigne	Vimont.
161	Rapport sur le Sulfure de Carbon et les Sulfo, Carbonates, La Submersion	Plumeau.
	La Destruction du Phylloxera	Boiteau.
	La Coultre du Raisin	Baltet.
162	Causes de la Chlorose chez l'Herbemont	Foex.
	L'Histoire du Traitement du Mildiou par le sulfate de Cuivre	Millardet.
	L'Anthracnose	Sol.
163	Enquete sur le Peronospora	Con-
164	Le Privilege des Vins a Bordeaux	gress Viticole d'Alger.
165	Reconstitution des Vignobles par les Cepages Americains	Kehrig.
166	Mission Viticole en Amerique	Rougier.
167	Catalogue des Vignes Americaines	Viala.
168	Mélanges	Bush
169	Traite de Chimie, tome 1	et Fils et Meissner.
170	Traite de Chimie, tome 2	Ch. Joly.
171	Traite de Chimie, tome 3	Pelouze et Fremy.
172	Traite de Chimie, tome 4	Pelouze et Fremy.

CATALOGUE OF BOOKS—Continued.

No.	Title of Book.	Author.
166	Traite des Chimie, tome 3	Pelouze et Fremy.
167	Traite de Chimie, tome 4	Pelouze et Fremy.
168	Traite de Chimie, tome 5	Pelouze et Fremy.
169	Traite de Chimie, tome 6	Pelouze et Fremy.
170	Tableau Général du Commerce de la France, tome 1. 1867-1876	
171	Tableau Général du Commerce de la France, tome 2. 1867-1876	
172	Tableau Général du Commerce de la France. 1876	
173	Tableau Général du Commerce de la France. 1877	
174	Documents Statistiques sur le Commerce de la France. 1881	
175	Documents Statistiques sur le Commerce de la France. 1882	
176	Documents Statistiques sur le Commerce de la France. 1883	
177	Documents Statistiques sur le Commerce de la France. 1884	
178	Documents Statistiques sur le Commerce de la France, tome 1. 1886	
179	Documents Statistiques sur le Commerce de la France, tome 2. 1886	
180	Costruzioni Enoteoiche e Vasi Vinari	Cerletti.
190	Indirizzo ai Proprietari ed ai Coltivatori	Società dei Viticoltori Italiani.
191	Commissão Central dos Servicos Phylloxericos	Villar D'Allen.
192	La Fillossera in Italia nel 1882	
193	Die Concentration des Mostes im Vacuum	Springmuhl.

MYCOLOGY.

No.	Title of Book.	Author.
194	Hand-Book of British Fungi, vol. 1	Cooke.
195	Hand-Book of British Fungi, vol. 2	Cooke.
196	Grevillea, vols. 1-2	Cooke.
197	Grevillea, vols. 3-4	Cooke.
198	Grevillea, vols. 5-6	Cooke.
199	Grevillea, vols. 7-8	Cooke.
200	Grevillea, vols. 9-10	Cooke.
201	Grevillea, vols. 11-12	Cooke.
202	Michelia, vol. 1	Saccardo.
203	Michelia, vol. 2	Saccardo.
204	Syllogi Fungorum. vol. 1	Saccardo.
205	Syllogi Fungorum. vol. 2	Saccardo.
206	Geneva Pyrenomycetum	Saccardo.
207	Fungi Italici, fasc 1-4	Saccardo.
208	Fungi Italici, fasc 5-8	Saccardo.
209	Fungi Italici, fasc 9-12	Saccardo.
210	Fungi Italici, fasc 13-16	Saccardo.
211	Fungi Italici, fasc 17-28	Saccardo.
212	Fungi Italici, fasc 29-32	Saccardo.
213	Fungi Italici, fasc 33-36	Saccardo.
214	Index Alphabeticus Fungi Italici	Saccardo.
215	Conspectus Generum Discomycetum	Saccardo.

ENGLISH.

No.	Title of Book.	Author.
216	Cross and Self-Fertilization in the Vegetable Kingdom	Darwin.
217	Wine, the Vine and the Cellar	Shaw.
218	Redding on Wines	Redding.
219	A Winter in Madeira and a Summer in Spain	Dix.
220	Wines and other Fermented Liquors	Sheen.
221	The Wine Press and the Cellar	Rixford.
222	The Grapevine	Meredith.
223	The Grape Culturist	Fuller.
224	Grape Culture, Wines and Wine Making	Haraszthy.
225	Fermentation	Schutzenberger.
226	Woodward's Graperies	Woodward.
227	Facts about Champagne	Vizetelly.
228	Facts about Sherry	Vizetelly.
229	Facts about Port and Madeira	Vizetelly.
230	A History of Champagne	Vizetelly.
231	Wines of the World	Vizetelly.
232	American Grape Growing and Wine Making	Husmann.
233	Origin, Nature, and Use of Wine	Thudichum & Dupré.
234	Report on Cheap Wine	Druitt.
235	Manufacture of Liquor	Lacour.
236	Distillation and Rectification of Alcohol	Brannt.
237	Practical Distiller	Byrn.
238	Practical Brewer	Byrn.
239	Cooling Cups and Dainty Drinks	Terrington.
240	The Ramrod Broken	
241	History of Ancient and Modern Wines	Henderson.
242	Viniculture of Claret	Maior.
243	Gauger's Manual	
244	Manual of Qualitative Chemical Analysis	Fresenius.
245	Chemistry of Common Life, vol. 1	Johnston.
246	Chemistry of Common Life, vol. 2	Johnston.
247	Farm Drainage	Elliott.
248	Catalogue of European Vines	Bleasdale.
249	Catalogue of American Grapevines	Bush & Son, and Meissner.
250	Barry on Wines	Barry.
251	Works of Pliny (1526)	
252	{ Wine and its Counterfeits.	Denman.
252	{ Wine Culture in California	Gibbons.
253	The Bordeaux Wine and Liquor Dealers' Guide	
254	{ A Memoir on Olive Growing	Pohndorff.
254	{ A Practical Treatise on Olive Culture	Flamant.
255	{ The Western Catalpa	Warder.
255	{ Woody Plants of Ohio	Warder.
256	Statements and Arguments Against the Proposed Franco-American Treaty	
257	Guide to the Study of Insects	Packard.
258	Injurious Insects of the Orchard, Vineyard, etc.	Cooke.
259	Insects Injurious and Beneficial	Cooke.
260	Insects Injurious to Fruit and Fruit Trees of California	Cooke.
261	Insects Injurious to Vegetation	Harris-Flint.
262	Insects Injurious to Fruits	Saunders.
263	Report on Cotton Insects, 1879	Comstock.
264	Rocky Mountain Locust	Riley-Packard-Thomas.
265	Insects of Missouri	Riley.
266	Insects Injurious to Forest and Shade Trees	Packard.
267	Fungus Diseases of the Grapevine	Scribner.
268	Ure's Dictionary, vol. 1	
269	Ure's Dictionary, vol. 2	
270	Ure's Dictionary, vol. 3	
271	Ure's Dictionary, vol. 4	
272	United States Dispensatory	Wood, Remington, and Sadtler.
273	German and English Dictionary	Adler.
274	French and English Dictionary	Clifton and Grimaux.
275	English and French Dictionary	Clifton and Grimaux.
276	Unabridged Dictionary	Webster.
277	Atlas of the World	Rand, McNally & Co.
279	Encyclopædia Britannica, vol. 1	
280	Encyclopædia Britannica, vol. 2	

CATALOGUE OF BOOKS—Continued.

No.	Title of Book.	Author.
281	Encyclopædia Britannica, vol. 3	-----
282	Encyclopædia Britannica, vol. 4	-----
283	Encyclopædia Britannica, vol. 5	-----
284	Encyclopædia Britannica, vol. 6	-----
285	Encyclopædia Britannica, vol. 7	-----
286	Encyclopædia Britannica, vol. 8	-----
287	Encyclopædia Britannica, vol. 9	-----
288	Encyclopædia Britannica, vol. 10	-----
289	Encyclopædia Britannica, vol. 11	-----
290	Encyclopædia Britannica, vol. 12	-----
291	Encyclopædia Britannica, vol. 13	-----
292	Encyclopædia Britannica, vol. 14	-----
293	Encyclopædia Britannica, vol. 15	-----
294	Encyclopædia Britannica, vol. 16	-----
295	Encyclopædia Britannica, vol. 17	-----
296	Encyclopædia Britannica, vol. 18	-----
297	Encyclopædia Britannica, vol. 19	-----
298	Encyclopædia Britannica, vol. 20	-----
299	Encyclopædia Britannica, vol. 21	-----
300	Encyclopædia Britannica, vol. 22	-----
301	Supplement, Encyclopædia Britannica, vol. 1	-----
302	Supplement, Encyclopædia Britannica, vol. 2	-----
303	Supplement, Encyclopædia Britannica, vol. 3	-----

REPORTS.

Reports, State Viticultural Commission, 1881-1888, 6 vols.
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CLARENCE J. WETMORE, Secretary.

REPORT

OF THE

Chief Executive Viticultural and Health Officer,

J. H. WHEELER,

For the Year 1887.

REPORT OF J. H. WHEELER,

Chief Executive Viticultural and Health Officer, for 1887.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I am unable to report to you for the whole twelve months of 1887, having been appointed to this office in March; since which time a fair share of my efforts have been devoted to an endeavor to properly qualify myself for the work.

It has been my pleasant duty to visit and examine many sections of the State where the industry of viticulture has gained prominence. I have found the interest in wine producing most concentrated in the bay counties.

The interest has fallen off, in a great measure, in Los Angeles and surrounding counties, where raisin growing has relatively enlarged in importance.

Fresno County has become an important raisin-producing center, and a marked interest in the subject has been communicated to neighboring counties.

The production of raisins in Yolo County continues important: her residents conceding no superiority to counties south.

Yuba, Tehama, and Shasta are proved raisin counties. While Solano, Sacramento, Placer, and other foothill counties are producing the bulk of shipping grapes designed for eastern markets.

The local markets are largely supplied by Solano, Sonoma, and Santa Cruz Counties; the latter being preëminently suited to the production of table grapes for the late markets.

The larger part of our wines at present come from Napa, Sonoma, Santa Clara, Alameda, Los Angeles, and Fresno Counties. Santa Cruz is making rapid strides in this direction, and some interest is being manifested in the planting of wine grapes in Ventura, San Luis Obispo, and Monterey Counties.

The greatly increased values of land in Los Angeles, San Diego, and San Bernardino Counties, together with the building of new railroads and their attendant stations and town sites, have so turned the attention of the people from viticulture, that few additions have been made to the plantations of the previous year.

In my studies and investigations I have to acknowledge the assistance of vine growers in every part visited. On all sides there has been evidenced a desire to aid your officer by all available means; to do all possible to forward our general interest, at the same time eliciting instruction.

I have many to thank for aid, and some excuses to make to those whose invitations to visit their vineyards I have been unable to accept, because of official work elsewhere.

THE SEASON'S CALENDAR.

The grape-growing season of 1887 has—unlike many preceding seasons—been characterized by the absence of any pronounced natural plague or scourge. As stated by some, “the grasshoppers, worms, and bugs have let our crops alone, only to be shriveled by north winds, consumed by

drought, or fall the prey to high-priced labor and low values." We have had the usual visit from the grapevine flea beetle, in May, which was buried in foliage made by the vines in June. Contemporaneous with this visitor came the false chinch bug, which did not, altogether, molest one acre in the State, although appearing in small spots in several sections. The vine hopper, or, as sometimes called, the thrip, became formidable in some sections, while almost disappearing in others.

THE VINE HOPPER.

More alarm has been manifested over the appearance of this pest than in any previous season, and certain varieties, viz.: the *Trousseau*, *Chauche Noir*, and Rieslings have been their special prey. This insect is exterminated with difficulty, because it derives its nourishment from the sap only, which we are unable to inoculate with any poison. Insects consuming directly the tissue of the leaf may be destroyed by spraying the foliage with an arsenic solution; but for the vine hopper, such resorts are of no avail. The hopper must be killed by mechanical means.

Sheep turned into the vineyard in fall has proved a valuable auxiliary to other remedies, but this is a resort seldom available. Carrying a torch through the vineyard at night—to which they are driven by disturbing the vine—has proved unsatisfactory; likewise some toxical solutions suitable for destroying other insects, but availing little with this.

THE USE OF PARIS GREEN.

Most of the enemies of the vine feed directly upon the foliage—the grasshopper, rabbits, squirrels, army worms, or sphynx-moth worm, beetles, scribe, false chinch bug, cutworms, etc. Special remedies have been devised for many of these; prominent among which is the arsenic and bran remedy for destroying the first three enumerated—an effective antidote, which can hardly be improved upon. The desirableness, however, of having a single remedy to meet all these parasites is apparent to every vineyardist.

The old—yes, the oldest remedy—Paris green or London purple, known to be destructive generally, has been brought into requisition. Extensive experiments have this year been conducted by me at Mr. Crabb's vineyard, Oakville, Napa County, to prove that a solution of Paris green or London purple—one pound to one hundred and sixty gallons of water—may be used to spray the foliage of the vine, while the grapes are small, with perfect safety to the consumer of grapes, wine, or raisins produced therefrom. The efficacy of the remedy as a destroyer, is not questioned; but, to determine whether—in California, where summer rains do not fall, a condition dissimilar to that found in sections where the remedy is known—I say whether, here, it could be used with the same guarantee of safety or not, seemed to me a question important enough to merit a trial. It is my pleasure to announce a perfect success: the products, grapes, and wine were carefully examined by Professor Rising, State Analyst, and proved innocuous.

I have prepared a full report of the experiment, which will be found in the Report of the Viticultural Convention for 1888, together with the other proceedings of the Convention.

FROST.

I have, from time to time, communicated to the public, through the press, the results of my study and observation on this subject; having made much original research, and, aided by many colaborers, I am able to report great progress.

The first and greatest calamity which visited our vineyards this season, was the frost, which will be remembered as the most damaging one which has yet appeared in California. It is safe to say that by direct effect, viz., destroying both fruit and foliage, and indirect, that by producing *coulure*, and impairing those grapes which were blooming at the time, the crop of the State for 1887 was reduced one third. The greatest harm was done in Napa, Sonoma, and the foothill counties. Incident to the loss and damage there occurred much study and investigation of effects, and methods of avoidance. The subject became one common and pertinent inquiry, the results of which, added to former researches, may be summed up as follows:

Under ordinary circumstances vineyards are damaged by frost only when the thermometer (F.) so set as to mark the true temperature of the vineyard, marks $+27^{\circ}$ or lower.

When there is no wind, and frost appears, vineyards of the lower ground ordinarily are harmed first and most. I say ordinarily, for I have found this rule sometimes modified by the nature of the soil. Silt and sandy soils are more productive of frost than clay or gravel. I have frequently seen this verified, a part of the same acre of vines, which part was of gravel and four feet lower than the remainder, escaped unhurt, while that on the higher sandy soil was badly frosted.

This may be explained in a measure by the fact that the growth made on the gravel was slow and toughened by lack of moisture, while that of the upper rich soil was full of water, rank and luxuriant. For this evil, nature affords a partial remedy in causing the vines on the richer soil to put forth later than those of the gravel.

Having disposed of the most common exception we will proceed with our rules.

When the air is moving appreciably and frost appears, the uplands are almost as subject to damage as the bottom lands. Occasions have appeared where the damage to uplands has been intensified by the greater advancement of the growth.

Recent experiences demonstrate that the vineyards of Central and Northern California may be damaged by frost as late as the middle of May.

Smoking, to keep off frost, has proved inefficient, except where the frost is extremely light—even then it has proved an unsatisfactory remedy, owing to the difficulty in getting the help out at a proper time. In 90 per cent of the cases where this remedy has been relied upon solely, it has failed when the temperature has reached the damaging point.

I have known vineyardists who smoked their vineyards, and who credited the process with success, when the thermometer marked only 32° , or a little lower. The same immunity would have been had if no smoke had been created.

I am unwilling to advocate smoking except as an auxiliary, and then to be employed late in the spring. Damp manure smothered with weeds makes the best smudge, and is far ahead of tar or other materials. To light the piles rapidly, a small amount of kerosene should be poured on,

*This is the temperature shown by the thermometer placed in the open vineyard and not on the side of a house, tree, or large object of any kind, which is never a true guide, as it retains and continues to give off heat.

and the same ignited with a torch or match. If the manure is placed in old sacks or mats it will be found convenient to move when cultivating, will keep drier through rainy weather so common at the season of frosts, and may even be removed at the end of the season if desired for another year.

The theory that vines which have been frosted may be saved by protecting from the direct rays of the sun when it appears, is exploded. Shading the frosted foliage will not save the vine from damage, nor even ameliorate it.

The remedy employed by Guyot, namely, that of covering the vines by mats, though an effectual cure for the evil, is one quite unavailable to California vineyardists with the present cost of labor and material, and the existing values for grapes and wine.

The most perfect cure yet known for damage from frost is the avoidance of the danger, by selecting a warm, protected, and elevated location on which to plant. Here the vine properly belongs in all cases, and is generally safe. There is, however, for those who have been unfortunate enough to choose a frosty locality, some consolation in the method of avoiding damage by proper pruning.

PRUNING FOR FROST.

To do this, so prune the vine that the desired buds shall remain dormant till this danger is past. One method of producing this result is that of leaving the vine unpruned, absolutely, until eight or ten days before the dangerous period is over; the dormant buds requiring about ten days to put forth a susceptible growth.

With this system, the terminal buds, and those on the laterals, come out early; and those left near the base remain perfectly dormant and safe till forced out later by pruning again.

Where practicable, this proves an efficient remedy. There are, however, but few cases which permit of this resort, as the growth of the previous year becomes so tangled as to require removal to permit of the ordinary operations of the vineyard in spring. Young vines of upright growth, and those grown on poor soil, will permit of the remedy, or it may even be carried on by first tying up the canes to permit of cultivating.

This method causes the fruit to ripen somewhat later, but this is little or no objection in California. A harm may, however, be accomplished by thus suddenly stopping the flow of sap entirely. I have seen vines pruned in this manner for three consecutive seasons without any apparent permanent injury to the plant, though the injury may become manifest later on.

Another method having many advantages over the foregoing, and open to few objections, is that of pruning one half the spurs (which would customarily be left), as usual, viz., short, leaving the balance of full length. If laterals are found on these long canes, all the better, as the presence of the lateral insures the dormancy of the bud at its junction with the main canes. In this case, with the approach of warm weather, the short spurs put forth, likewise the terminal buds on the long canes and laterals. If the frost comes, it destroys all this; following which the short spurs put out a growth from the secondary buds, providing little fruit, but furnishing good canes for next year's spurs. The long canes may now be divested of laterals, and pruned short immediately following the frost, and they will then, after about ten days, commence to produce the same growth and fruit which would have been obtained without frost, or which would have been obtained with the adoption of the ordinary method of short pruning.

Again, if no frost appears, the long canes may be pruned back at the time when danger is past without any serious setback, as by this time the short spurs are out and showing fruit. The work, too, is made comparatively simple by the vines having been previously pruned up into shape. The method entails some irregularity in the ripening of the fruit, but this has proved no serious difficulty. But little more labor is required, and the most absolute safety secured. I have seen this method practiced on a large scale with eminently satisfactory results.

The knowledge of one fact will enable the grower to adopt methods peculiarly suited to his locality or variety to be pruned.

If the laterals of any cane of fair size be allowed to remain at the time of pruning, it insures the dormancy of the bud at its junction with the stem. This is true in all cases, except when but too few canes are left in proportion to the strength of the vine; or, when the vine is very small and young, in which latter case more canes should have been allowed to remain.

With this fact in view, the pruner of long wood varieties in frosty localities should leave enough laterals on the spurs remaining to insure him against loss. Be it known, also, that the laterals, where such are left, may be relied upon for heavy fruiting wherever a case of necessity arises. They will set as early and as well as, if not better, than the original canes from which they spring. Short-pruned varieties which put forth very early in sections liable to frost—such, for instance, as the Folle Blanche—may be advantageously pruned, as before indicated, leaving the laterals on the remaining long canes to insure the buds at the base of these canes continuing dormant. After nearing the frost period, these should be pruned off and a spur of the desired length, with only dormant buds, will be the result. This process I have witnessed—the results being satisfactory.

Thus it may be seen that, by intelligent pruning, the common damage by frost may be averted, though entailing some additional expense and perhaps some loss to the plant—a loss, much less, however, than that often observed where no remedy is adopted.

High pruning is a remedy much like smoking. Where frosts are light, vines trained high will escape the still frost, when if pruned low they will be scorched. A heavy frost will injure both high and low pruned vines, and the short pruned fares worse, even here.

The freeze, accompanied by a wind or gently moving air, has been known to injure the tops of high vines leaving the bottoms untouched. This phenomenon occurs most frequently late in spring, when the foliage is well advanced, thereby protecting the lower parts.

FUNGOID DISEASES—OIDIUM.

The *oidium*, or powdery mildew, commonly called mildew in California, is the most common enemy of its class. The past season has been one of little complaint from this source, probably owing to the liberal use of sulphur, practiced now annually by our vineyardists. For a full description of this *oidium*, with remedies and treatment, see Appendix I, devoted to that subject, and accompanying this report.

PERONOSPORA VITICOLA

Is known more commonly as downy mildew. This disease, together with anthracnose and black rot, are common throughout the States east of the Rocky Mountains. They form a present scourge to Europe, but are not known to California vineyardists. Dr. Harkness states that he has found

peronospora upon the *V. californica*, but there only. My searches for this disease, and they have been prosecuted with considerable vigilance, have never revealed its presence in the State. It has frequently been reported to me by vineyardists, but on inspection I have found some other trouble only. When Professor Viola, of the Agricultural School of Montpellier, was visiting California in September, in company with F. L. Scribner, of our Department of Agriculture, it was my pleasure to visit several vineyards with them; but we were unable to find any evidence of *peronospora*. I exhibited to them various specimens of leaf diseases which had been sent to me for *peronospora*; but they pronounced them "diseased epidermus." The "Spanish or black measles," so called in the northern valleys, they did not recognize as anything they had seen before: but did not regard it as very formidable.

The conditions favorable to the development of *peronospora* are known to grow only out of an extremely humid atmosphere. Actual moisture must be deposited and continue on the leaves—such as results from summer rains. I believe, therefore, that California vineyardists have, in our dry and comparatively rainless summers, an assurance that this disease—one which ranks second only to the phylloxera in France—will never become common. It would be idle to presume that it had not been introduced with some of the direct importations of stocks from diseased districts. We should have suffered from its general attack long before this if our climate did not preclude it.

POURIDIE

Is a fungus found to infest many California vineyards, particularly those planted on wet and improper soils. It has been observed only during the last few years, though probably existing previously, unrecognized. The disease is well known in Europe, existing there as here, only in spots unfit for vineyard purposes. When found, it has been sometimes termed "root rot," a very proper name, in that it affects the roots, with the following symptoms: The vine shows general signs of enfeeblement, growing sometimes for a short period with increased vigor, but soon relapsing into a meager production of foliage and subsequent rotting of the roots, both large and small. These latter exhibit a brown color, and appear saturated with water, so much so as to show water plainly when cut. The trunk of the vine continues healthy, though the foliage appears like that of a vine infested with phylloxera. Vines affected may continue to live for six, ten, or even fifteen months, varying as the conditions are more or less favorable to the development of the disease. A large area may become infested in a short time if the whole is similarly situated. The disease thrives in excessively humid soils. Particularly is this the case where there exists an impervious subsoil, which forms in a subterranean basin wherein there remains stagnant water. Germs of the disease may be introduced on the vines themselves, or may come from vegetables or trees.

At first the new fibers of the affected plant show no signs of the attack; but soon swellings will be seen on the old roots which break through the bark and protrude a pithy growth, which soon becomes dead and rotten. After some time the whole substance of the root decays to such an extent that the vine, at this stage, may be easily uprooted by hand. To cure the evil, one can only hope to so modify the conditions of the soil as to prevent the further spread of the disease, and then destroy the vines on which it exists. They should be immediately pulled up and burned on the spot, to avoid any diffusion of the spores to other places. Following this, the ground should be thoroughly worked over and drained. Leave the spot

unplanted for several years, after which the place may be again planted to vines.

I have had several samples of this disease sent me from the counties of Sonoma and Napa, besides receiving reports of its presence from several other counties. The malady cannot flourish on well drained soils—soils to which alone the vine belongs; but the vineyards of the wet lowlands or undrained uplands should be carefully guarded against its introduction and spread.

Before leaving the subject of diseases of the vine, I should remark concerning the trouble which has occurred in many of the vineyards about Orange, Anaheim, and elsewhere in Los Angeles County, that the attention of our leading scientists, and students has been repeatedly called to the unknown disease, and they have as yet failed to identify it as due to any particular fungus or parasite; and our former impressions continue concerning it, viz.: that it is purely the result of climatic influence.

Sudden or unfavorable changes in temperature produce like results in the northern counties; but are not of such general occurrence. I have known many vines killed thus during the past year.

A warm spell in winter preceding a cold one, though the latter be not a regular freeze, may kill the vine or so nearly destroy it that it dies the succeeding summer. I have received recently samples of vines so injured. Examination of the buds, which had failed to put forth, shows a brown and dead center—proof of the presence of moving sap in cold weather. The collar of the vine—that part of the stump which joins the trunk to the roots—was found dead and brown. Inasmuch as this is the tenderest part of the plant exposed, it suffered with the buds, from a winter start of the sap succeeded by cold weather. Vines so affected and others near, but not exhibiting the same signs of the attack, lingered through part of the summer and died in a manner similar to those noticed in Los Angeles County.

Those counties favored with occasional warm and springlike weather in midwinter, are, I believe, most liable to complaints of this nature.

PHYLLOXERA.

The spread of this insect has been far more rapid during the past season—favored by drought as it has been—than ever before. Abundant new spots have become manifest, and several new districts have been added to the quarantine list. I have found new instances of their spread by the use of cuttings taken from diseased vineyards; though convinced that their principal means of distribution has been by rooted vines.

I have found the winged insects common throughout the months of June, July, August, and September, giving them a long season in which to increase the infected territory.

Few of our vineyardists appreciate the fact that the progression governing the increase of this pest is one of geometrical ratio—not an additive one; and though it may be several years before the presence of a few insects become evident in the vineyard, from that time on the spread is alarming, and, without stern resistance be offered, the giving way of a few acres, or even a few hundred vines, means the loss of all within a limited number of years.

The reports of the Commission issued heretofore concerning this pest, and the best remedies for its extermination which we have urged for adoption, are more than ever confirmed at the time of this writing. As proof of this I am able to give the following, which I translate from the report

of "*La Commission Supérieure du Phylloxera*," of France, for 1887, representing as it does the results of unlimited experiments and long years of practical work:

The struggle against the phylloxera goes on by submersion, insecticides, and by replanting with American vines in the following proportion:

	1887.	1885.
Submersion, number of acres treated	66,662	50,847
Sulphide of carbon, number of acres treated	165,512	101,462
Sulpho-carbonate, number of acres treated	22,050	13,067
American vines, number of acres treated	416,292	188,205

It may thus be seen that great preference is shown for resistant vines, the acreage rising in two years from one hundred and eighty-eight thousand two hundred and five acres, to the enormous figures of four hundred and sixteen thousand two hundred and ninety-two acres. This answers the question so often put to me by vine growers: "Are resistant vines a success?" We have published advice on this subject continually, but there do not exist to-day in the whole State, two thousand acres of resistant vines. Those resistants which have been properly selected, planted, and cared for, are to-day monuments of success, but they are too few to save us from the growing ravages of this pest.

It will be noted in the above, that the use of carbon bisulphide has largely increased in France; that the use of sulpho-carbonates, because of the great expense attached, has grown less popular. The number of vineyards submerged is nearly constant, because of the special natural requirements of this process. For fuller particulars concerning the success of different remedies employed in Europe, and the resistant vines most popular at the present day, the reader is referred to Appendix V of his report, which treats of the results obtained in the vineyards of southern France by the use of various methods and varieties.

California vineyardists can point with pride and assurance to the planting of grafted resistant vines, belonging to Mr. Julius Dressel of Sonoma, where, in the midst of ravaging phylloxera, and on soil of very moderate worth, a magnificent yield of choice varieties has already been secured by this means. Others have been similarly successful in growing and grafting resistant vines; but I have, as yet, found no other test so severe in its nature as that conducted at Mr. Dressel's vineyard. Mr. Dressel states that he is perfectly satisfied with the *Riparia* as a grafting stock—easy to root and sufficiently vigorous in his soil to supply any vigorous growing variety. The *Lenoir* has been growing rapidly in favor in California, because of its rapid development and easy grafting. It proves difficult to root, but is preferred over the *Riparia* and some others, because it furnishes a wine suitable for blending as a direct producer. But grafting is both expensive and slow, and, in fact, the value of carrying on any warfare may be somewhat altered by the present depressed condition of the wine-making industry and the popularity and improved value of other branches of agriculture in California.

During this season, when grapes for wine making have in some instances sold for as low as \$7 per ton, and the average in many districts has been only \$12, the question has frequently arisen: Would it not be better when the phylloxera appears to replant and reconstitute the vineyard with prune trees, almonds, olives, or other fruits unsusceptible to the phylloxera? There are cases, where, unless there exists some special reason for keeping up the vineyard, viz., particular appropriateness of soil and unsuitability for other use, it may be best to adopt this alternative, continuing the produc-

tion of the vineyard as long as it proves profitable, or at least until the trees should come well into bearing.

Where excellent wines have been produced and a market therefor has been established—particularly if the brand has become well known by advertising at great expense; or even where expensive facilities for making and holding wines have been provided—here are found exceptions demanding the continuance of the vineyards and warring off the phylloxera, even though the expense be considerable.

HERBACEOUS GRAFTING.

I have to say, concerning this method of changing varieties—particularly described in the paper published with this report—that although generally tried, the method has proved a signal failure. One disciple of this Commission, residing in Australia, reports a success of five out of eight. If such results were possible in California, I should be greatly encouraged to make another effort, earlier in the season, but as it is we are able only to record the experiment as valuable in its negative results; providing, as it will, *against* the general or extensive use of it at any future time. My attention has been called to several other methods of grafting, which will be thoroughly tried by me during the coming spring. One particularly, that of side grafting, is, I believe, of great promise. It consists in inserting the scion into an incision in the side of the root or collar of the vine, with a partial suppression of the top to force its growth. Thus the growth of the scion may be assured before the old vine is cut off, and if failing, no fruit or time is lost, as the process may be similarly repeated the next year. The many other advantages of this method will be apparent to vine growers; nor is the method purely experimental in California, for it has already been tried in a very few instances, and these with some success.

* OIDIUM (TUCKERI) AND THE USE OF SULPHUR.

BEING

Appendix 1 to the Annual Report of the Chief Executive Viticultural Officer
FOR THE YEAR 1887.

The *oidium* (*tuckeri*) is a vegetable parasite of American origin. It attacks all growing portions of the vine, and imparts to the leaves a chapped appearance, and gives them a whitish or gray color. The vine, when badly affected, has a blighted and sickly appearance; the young leaves and tender parts become dried and roll up, attacked, the herbaceous parts blacken, cease to grow, and end by withering and drying up. This latter extreme is rarely attained in California. The growing berries are attacked as readily as other parts, giving the whole a languishing and unhealthy aspect. The young branches also present blotches of a powdered nature, which ultimately cover the greater part of the surface exposed to the sun, and where badly affected, also taking on a whitish, powdered, and, eventually chapped appearance, which causes them to crack open and cease to grow. Thus it will be seen that the *oidium*, unlike other fungus, affects the crop directly, as well as indirectly, through damage to the foliage. The parasite first appears abundant in June, though frequently commencing its attack in May, at or after the time of flowering.

The conditions favoring the *oidium* are moisture and warmth, the latter playing the most important part. The moisture here meant is not the extremely humid condition of the atmosphere which appears with or immediately follows a rain or heavy fog. A condition often incorrectly named as favorable to *oidium*, but merely the moisture to be found in a sea breeze after it has traveled ten, twenty, or even thirty miles inland. An atmosphere which produces a light dew at night is sufficiently moist to favor to the utmost the propagation of *oidium*. Quite different in this respect is the *Peronospora* and *Anthraco*, which require the deposition of heavy rain, fog, or excessive moisture to produce their growth. For this reason, I believe, California has been comparatively free from the true *mildiou*, a disease which, of late years in France, where summer rains are frequent, has threatened the vineyards to as great an extent as has the dreaded *phylloxera*.

Our principal vegetable parasite thus far has been the *oidium*, one especially favored by our dry, warm climate, and one easily destroyed by the timely application of sulphur.

As before remarked, excessive moisture is unfavorable to the propagation of *oidium*, and a good shower will do much to remove and destroy the germs.

*Frequently and improperly confused with *mildiou*, which it is not. The true *mildiou* is the dreaded *Peronospora viticola*, a parasite far more formidable than the disease we commonly treat with sulphur, and one which does not succumb to this or other simple remedies. It might be, and is sometimes, properly termed "powdery mildew," distinguished thus from downy mildew, which is *Peronospora viticola*.

The misnomer of the parasite common to California frequently leads to a confusion of remedies—sulphate of copper and slacked lime is the remedy for *mildiou*—but one not necessary for our *oidium*.

As to temperature, the disease begins its development where the average of day and night runs up to 53° F.; it spreads rapidly at 70°, and is checked in its growth where the thermometer indicates near 100°. Above 100° its damage is rapidly diminished, and at 112°—a temperature quite common throughout the interior vineyard districts of California—the germs lose their vitality and the effects of the disease entirely cease.

To be sure, where vines make a dense growth, and are trained high above the ground, the germs may be so sheltered in shady spots as to escape the effects of the heat. Where, on the contrary, the vines are trained along or close to the ground and receive the reverberated in addition to the direct heat of the sun—the manner in which vines should be trained—then, the high temperature above named accomplishes a complete extermination of the parasite, a result which has often been noted in Algiers, where such temperatures are frequent throughout the early growing period of the vine.

Let it be borne in mind generally that the propagation of the *oidium* and other vegetable parasites of the vine are greatly favored by trellises and high training. Short pruned vines and those trained close to the ground are most exempt from fungoid diseases.

A hot north wind will sweep the *oidium* from a vineyard well exposed to its effects. This forms one of nature's most common remedies in California, and should be a consolation to those who may otherwise lose by it in the grain field.

Some varieties of vines are found more susceptible to the attack of *oidium* than others; other conditions being similar.

This fact should influence the vineyardist as to the frequency of applying the remedy and the amount of sulphur employed:

Varieties particularly subject to the effects of *oidium* are: the Folle Blanche, Crabb's Black Burgundy, Muscat, Chasselas, Zinfandel, Teinturier Gamay, Cabernet Sauvignon, Cabernet Franc, Riesling, Carignane, Terret, and Cinsaut. Among those little susceptible are the Grenache, all of the true Pinots, the Alicante Bouschet, Petit Bouschet, Colombar, Sauvignon Blanc, and the Aramon. The American grapes *Vitis labrusca*, *V. riparia*, and *V. rupestris* are but little affected by *oidium*.

Remedies.—Many substances have been applied, principally in the form of powders. Lime has been extensively employed, and it has been found that any dust effects beneficial results on the diseased plant. None have proved so efficacious, however, as sulphur dust, and on this we can rest our perfect reliance, for, if properly applied, it effects all that may be desired in the way of a cure, and is comparatively inexpensive. The *oidium* is a disease quite easy to treat, because its spores and growth are confined to the exterior and exposed portion of the plant, which is not the case with the *Peronospora viticola* and some other vegetable parasites.

The Application of Sulphur as a Remedy.—There have been many conflicting and erroneous statements made concerning this remedy, its application and effects, as applied in California. Imperfect and hasty generalizations, drawn from limited local experiences, have not unfrequently been published, and results both expensive and wasteful have often followed. To correct the wrong impressions thus formed and save further dispute, it seems necessary to treat the subject in a somewhat technical manner, the truth on some points of which it seems to me precludes the possibility of further dispute as to kinds which should be employed: the difference in the effect of various brands, imported or domestic, and the manner and time best for making the treatment.

The vineyards of California consume annually twelve hundred tons of sulphur, an average of about fifteen pounds of sulphur per acre. None of

this sulphur is the product of California mines or deposits, as many suppose. For three years previous to 1887 sulphur sublimers and grinders have been entirely dependent on countries other than the United States for their raw material. There has of late years been no sulphur found in California which would pay the cost of mining, refining, and transportation to San Francisco, and be sold here at even double the present cost of sulphur imported from Sicily or Japan.

Four years ago California received small quantities of sulphur from Nevada, but the competition of cheap labor in the Orient, and cheap transportation by sea, soon choked out the local industry. Considerable promise comes to the home industry now from Utah, where large deposits are being worked, and the refined product, ground and sublimed, are being placed on the California market at the same figures as the imported vineyard sulphur, or that prepared in San Francisco from the imported raw material. How long the sulphur mines of Utah will continue available to consumers in the United States will depend entirely upon railroad freights, which have of late been so capricious as to preclude any certain future dependence.

To show the comparative insignificance of our own sulphur mines, let it be known that in 1880 there were mined in the whole United States six hundred tons, while our imports for 1881 aggregated one hundred and five thousand four hundred and thirty-eight tons.

This latter quantity came almost exclusively from Sicily. Virtually the island of Sicily furnishes the world with sulphur, notwithstanding Japan is now her most formidable competitor for the Pacific Coast of North America. Sicily has for years been the original point of production for sulphur used in vineyards the world over; and whether this sulphur—sold mostly in commerce as “Sicily seconds,” and containing not to exceed 3 per cent of ash impurities—has gone first to Marseilles or Antwerp to be ground or sublimed, or whether it has come to New York or California to be ground or sublimed, it has made but one essential difference to California vineyardists, viz.: all sulphur sublimed without the United States pays a duty on entering our ports of one cent per pound, which sometimes makes an addition of nearly fifty per cent to the selling cost. All other brimstone, crude or ground, except in rolls, pays no duty.

I desire to draw particular attention to this difference for the instruction of those who have with this, as with California wines in past years, been led to believe that any goods bearing a French label are better than those produced at home. The case is a parallel to that by which our wine drinkers were long duped by French labels.

Some may claim that the sulphur ground or sublimed in Europe is finer than that prepared in California. To determine this I have examined carefully over twenty samples of sulphur which I have been collecting and carefully saving for several years past, with the following results: Domestic preparations of sublimed sulphur have averaged as fine as those from Marseilles or Belgium. Of the ground sulphur, that produced in California has generally proved the finer; and the finest of all prepared by either method was ground sulphur prepared in California.

So much to the credit of the home industry. I have learned direct from the leading importer of foreign prepared sulphur that generally the Europeans do not grind as fine as is the practice in California; but that if California markets so demand, it may be prepared as fine as needed. This is because they expect us to use sublimed sulphur if sulphur in a fine condition be needed. They care little about the import duty of one cent per pound on the latter, so long as they are reimbursed. Nor is it their busi-

ness or care whether we use one variety and avoid the tax, or the cheaper, with equally beneficial results.

The imports of sublimed sulphur to a single merchant in this city have cost California vineyardists in the past three years nearly \$15,000 duty, no benefits of which have accrued to our vineyards; and this, a loss to proprietors, adds another conspicuous monument to the long and unwholesome practice among some of our people of aping the French in everything.

We therefore conclude from the foregoing that "California sulphur" means sulphur from other countries, ground or sublimed only in California; and that for economy's sake, if any one insists on a foreign article, he should buy the ground sulphur and thereby escape the duty of one cent per pound.

Comparative Value of Ground and Sublimed Sulphur for Vineyard Use.—This much mooted question has been carelessly handled by many. First let us comprehend the effect of any sulphur distributed in the vineyard. Sulphur, in a fine condition, exposed to the atmosphere, undergoes a partial evaporation; the vapor produced comes in contact with the germs or organs of the *oidium* and accomplishes their destruction. Evaporation is, therefore, the result desired. This evaporation is particularly favored by exposure to the sun's heat, and especially when the ambient temperature reaches 70° F. or over.

Now, other things being equal, the finer the sulphur the greater must be the surface exposed, and consequently the more rapid the evaporation. Evaporation is the result desired. Sublimed sulphur is that produced by boiling crude brimstone and condensing the vapor thus formed in a closed chamber. In cooling the vapor the sulphur is recovered in little round globules. Several of these globules are usually attached and form a string in appearance when magnified, much resembling a string of beads. The sulphur in this shape exposes less surface than could be produced in any other form; so that with equal fineness, ground and irregular particles would better answer our purpose. To demonstrate this practically, two samples of the same sulphur accurately determined in weight, one ground and the other sublimed, were exposed to the same heat as if in the vineyard. Samples selected for this purpose were of apparent equal fineness. The same were weighed from day to day, and the experiment repeated several times; and the above conclusions were amply borne out in every weighing. Not only did the sublimed or flowers of sulphur evaporate less, but it also showed a more rapid formation of sulphuric acid than the ground sample, thus furnishing another objection to the use of sublimed sulphur: one which its exponents have frequently and incorrectly urged against the use of ground or triturated sulphur.

I have yet to know of any considerable damage done to vines by the sulphuric acid existing as an impurity in the commercial article, either ground or sublimed; though some have strongly urged the presence of sulphuric acid as an objection to ground sulphur. This is wrong, as there is every condition to favor the formation of sulphuric acid in the operation of subliming sulphur, and nothing to favor such formation in the grinding process. Specialists who have made this matter a thorough study, corroborate my conclusions.

I do not urge this as an objection to the use of sublimed sulphur, but if any disadvantage accrues from the presence of sulphuric acid, it must not be laid at the door of the ground sulphur.*

In connection with this, let it be known that neither subliming nor grinding does in anywise alter the chemical nature of sulphur, which is an ele-

* The presence of considerable quantities of sulphuric acid may be detected by the lumpy condition which results from its presence.

mentary substance and unalterable chemically, otherwise than by combining it with some other element or compound. It is not changed in its preparation as above named, any more than would be pure lead if made into shot by melting or by being cut to the proper shape. The same analogy holds true as to its source—pure lead from one mine or country is chemically identical with that from any other mine or country. So with sulphur from Sicily, from California, or any other country. This I state for the benefit of non-chemists, some of whom have thought prepared sulphur to be a compound altered from its elementary condition, and hence variable in strength.

One point favoring the sublimed sulphur is, that in preparing it the product is freed of the ashy impurity existing in the crude article of commerce, to the extent of from one to three per cent. This impurity, however, is a neutral volcanic ash, which works no injury to the vine, and in buying, ground sulphur can only be estimated as a loss of from one to three per cent—a loss which is in nowise commensurate with the difference in price of the two forms, ground and sublimed.

We find European authorities of the present date unanimous in the opinion that finely ground or triturated sulphur is more suitable for vineyard use than the sublimed.

Professor G. Foex, who is Director and Professor of Viticulture at the National School of Agriculture, at Montpellier, in his "*Cours Complet de Viticulture*," published in 1886, says:

Formerly, only sublimed sulphur was employed (in the vineyards) because it contained more sulphurous acid; but since, learning that the effect of the sulphur on the *oidium* is due to the vapor which it emits at an elevated temperature, a result obtained as well with ground as with sublimed sulphur, the former being considerably cheaper, has come into general use.

Furthermore, the use of flowers of sulphur is seriously objectionable, inasmuch as it consists of little globular particles which are readily lost from the foliage of the vine under the influence of a light breeze. Its application affects the workmen, too, with a trouble known as *ophthalmie des sulfureux*—affecting the eyes.

The ground sulphur, on the contrary, which is made up of angular and irregular particles, adhere more closely to the green portions of the vine and trouble the workmen much less.

M. A. Du Breuil, M. La Forge, and others, express the same preference for finely ground sulphur.

How and When to Apply Sulphur.—For very small vineyards, the dredger, an instrument much resembling a large pepper box, answers well enough, especially while the vines are young. For more advanced vineyards and larger areas, the bellows should be used, holding from three to five pounds of sulphur. These latter are furnished by local manufacturers, and effect a considerable saving of time, labor, and material over the dredger. By the use of the bellows, too, the sulphur can be more evenly distributed. A simple open nozzle is the best; any perforated cover for this latter is apt to get clogged, and the bell-shape frequently given to it does not spread or expand the sulphur jet—a purpose for which it is designed but fails to accomplish. A bent nozzle is more of an incumbrance than an advantage. The simplest, strongest bellows of good size, will prove cheapest and best in the end. With this tool a workman will sulphur from five to eight thousand vines per day—vines in an advanced state of vegetation. He may apply as many pounds of sulphur per day with other instruments, but it can not thus be so evenly distributed nor cover the same area.

The powdered sulphur should be applied so as to lodge as much as possible on and near the growing parts of the vine. This secures a dense sulphur vapor in direct contact with the diseased organs. Sulphur on the old

stump, or even on the surface of the ground, will destroy the *oidium*, but a larger quantity would be required.

Sulphur falling on the ground is by no means lost, but a lesser quantity will answer if lodged on the leaves and branches. It has been stated that sulphur falling to the earth is lost by its effect being immediately neutralized. The sulphurous acid formed is neutralized, but the vapor of sulphur—the active disinfectant—is not neutralized; nor is the effect of the sulphur lost, except as it be covered up and hid from the sun and air.

The simplest rule as to the time for applying sulphur is: "Treat the vineyard whenever the disease makes its appearance." But, if we desire to apprehend even its introduction, which is the general custom in California, the first application should be made at or about the time of flowering, as at this period the disease is apt to attack the delicate organs of fructification and render the vine infertile. Altogether the most favorable results have been obtained by sulphuring at the time of blossoming. This, too, is one of the methods of combating *coulure*, a trouble which will be treated later on. Young vines do not require so frequent sulphuring, nor so great a quantity, as vines in full bearing. The former should be sulphured when the shoots attain the length of a few inches; and again, later on, if the *oidium* makes its appearance. Bearing vines should, in addition to the treatment at blossoming, receive a second application from the first to the middle of June, and again, later on, if the disease makes its appearance.

Wine grapes should never be sulphured after the berries attain their full size, as the sulphur reaching the wine vat is converted during fermentation into sulphureted hydrogen—the odor of rotten eggs—to the ruin of the product. Table or raisin grapes may be sulphured later if desired.

The quantity used at each application may vary with the number of vines per acre, and should be governed somewhat by the susceptibility of the variety as before explained. Less is needed for the first than for subsequent applications, when the vines attain full proportions. The quantity commonly used in California for old vines subject to *oidium*, is about eight pounds per acre for the first treatment, and from twelve to twenty pounds at the second application.

The use of this remedy in conformance with the above instructions, will effect a great saving over conventional methods pertaining at present in California. Not unfrequently our vineyardists sulphur in weather positively prohibitory to the disease. Varieties but little liable to *oidium*, situated, perhaps, in the hottest and driest interior localities, and trained low to escape it, often receive a dose which goes only to fertilize the soil and stimulate the growth of the vine.

This latter function is one which, however, must not be overlooked; the general aspect of the vine is always improved and vegetation greatly stimulated by the free use of sulphur. A small percentage only of the sulphur applied vaporizes—the balance works into the soil, becomes slowly oxidized, and finally unites to form sulphates of the alkalies and alkaline earths, which are in substance the essential ingredient of some of the best fertilizers. Still, it is well to know whether the sulphur is applied for the cure of *oidium* and as a fertilizer, or as a fertilizer only.

The most favorable hours for applying sulphur, are from 8 or 9 o'clock in the morning to the middle of the afternoon, preferably from 9 A. M. till 2 P. M. The sulphur which comes in contact with dew or other water, is in nowise altered thereby, but ceases to give off its vapor only until the water evaporates, and thereby exposes its surface to the atmosphere. A rain following the application of sulphur does not alter this element, but results

in damage only in removing the particles mechanically from the foliage of the vine to other places more remote from the seat of disease.

Any wind other than very gentle, will do much to shake off and remove the sulphur from the leaves. A windy day should therefore be avoided. In fact, a hot, still midday is best in all respects, as amply proven by the strong odor of sulphur prevailing at the time of such an application.

In purchasing sulphur, its quality and fineness may best be determined by the use of the microscope. The weight of a given bulk will establish the relative fineness, but cannot be used in comparing sublimed with ground, as the mechanical condition of the two are different—sublimed sulphur is in beaded strings, and occupies more space than ground sulphur, much as shavings are of greater bulk than sawdust. To persons experienced in its use, the fineness may be determined by the feeling—almost impalpable it should be. I have never known this sulphur adulterated, although ground sulphur is frequently added to the sublimed to enable the merchant to sell it cheaper. All samples of eastern sublimed sulphur examined, I have found mixed in this manner, showing that the credit of ground sulphur has sometimes been unconsciously extended to the so called and more expensive sublimed.

Where the question of purity or fineness arises with any vineyardist, samples may be sent to this office, where a prompt determination will be made and reported without cost to the applicant.

To further substantiate these recommendations of the ground sulphur, I will state that of the sulphur used of late years in California vineyards, over three fourths has been ground sulphur; and I have yet to know of any one employing sulphur extensively who has abandoned the ground, or even that ground in California for the foreign prepared or sublimed sulphur, which latter sells at one and a quarter to one and a half cents higher than the ground or triturated.

Ground sulphur may be easily distinguished from sublimed by the difference in color; the latter always shows more yellow, the former more white, or a lighter tint of yellow.

J. H. WHEELER,
Chief Executive Viticultural Officer.

THE PURE WINE BILL (with Comments and Explanations).

BEING

Appendix 2 to the Annual Report of the Chief Executive Viticultural Officer
FOR THE YEAR 1887.

NOTE.

To the Board of State Viticultural Commissioners:

GENTLEMEN: To answer at once the numerous inquiries put to us concerning the Pure Wine Law of California, now going into effect, I have thought proper to place in the hands of every viticulturist, wine maker, and dealer, the following copy of the law with the appended explanations and instructions.

Yours, very respectfully,

JOHN H. WHEELER,
Chief Executive Viticultural Officer.

San Francisco, May 25, 1887.

Substitute for Senate Bill, No. 219, adopted in Senate February 17, 1887—An Act to Prohibit the Sophistication and Adulteration of Wine, and to Prevent Fraud in the Manufacture and Sale Thereof.

The People of the State of California, represented in Senate and Assembly, do enact as follows:

SECTION 1. For the purposes of this Act, pure wine shall be defined as follows: The juice of grapes fermented, preserved, or fortified for use as a beverage, or as a medicine, by methods recognized as legitimate according to the provisions of this Act; unfermented grape juice, containing no addition of distilled spirits, may be denominated according to popular custom and demand as wine only when described as "unfermented wine," and shall be deemed pure only when preserved for use as a beverage or medicine, in accordance with the provisions of this Act. Pure grape must shall be deemed to be the juice of grapes, only, in its natural condition, whether expressed or mingled with the pure skins, seeds, or stems of grapes. Pure condensed grape must shall be deemed to be pure grape must from which water has been extracted by evaporation for purposes of preservation or increase of saccharine strength. Dry wine is that produced by complete fermentation of saccharine contained in must. Sweet wine is that which contains more or less saccharine appreciable to the taste. Fortified wine is that wine to which distilled spirits have been added to increase alcoholic strength, for purposes of preservation only, and shall be held to be pure, when the spirits so used are the product of the grape only. Pure champagne or sparkling wine is that which contains carbonic acid gas or effervescence produced only by natural fermentation of saccharine matter of musts, or partially fermented wine in bottle.

SEC. 2. In the fermentation, preservation, and fortification of pure wine, it shall be specifically understood that no materials shall be used intended as substitutes for grapes, or any part of grapes; no coloring matters shall be added which are not the pure products of grapes during fermentation, or by extraction from grapes with the aid of pure grape spirits; no foreign fruit juices, and no spirits imported from foreign countries, whether pure or compounded with fruit juices, or other material not the pure product of grapes, shall be used for any purpose; no aniline dyes, salicylic acid, glycerine, alum, or other chemical antiseptics, or ingredients recognized as deleterious to the health of consumers, or as injurious to the reputation of wine as pure, shall be permitted; and no distilled spirits shall be added except for the sole purpose of preservation, and without the intention of enabling trade to lengthen the volume of fortified dry wine by the addition of water, or other wine weaker in alcoholic strength.

SEC. 3. In the fermentation and preservation of pure wine, and during the operations of fining or clarifying, removing defects, improving qualities, blending and maturing, no methods shall be employed which essentially conflict with the provisions of the preceding sections of this Act, and no materials shall be used for the promotion of fermentation, or the assistance of any of the operations of wine treatment which are injurious to the consumer, or the reputation of wine as pure; *provided*, that it shall be expressly understood

that the practices of using pure tannin in small quantities, leaven to excite fermentation only, and not to increase the material for the production of alcohol; water before or during, but not after fermentation, for the purpose of decreasing the saccharine strength of musts to enable perfect fermentation; and the natural products of grapes in the pure forms as they exist in pure grape musts, skins, and seeds; sulphur fumes to disinfect cooperage and prevent disease in wine; and pure gelatinous and albuminous substances, for the sole purpose of assisting fining or clarification, shall be specifically permitted in the operations hereinbefore mentioned, in accordance with recognized legitimate custom.

SEC. 4. It shall be unlawful to sell, or expose, or offer to sell under the name of wine, or grape musts, or condensed musts, or under any names designating pure wines, or pure musts as hereinbefore classified and defined, or branded, labeled, or designated in any way as wine or musts, or by any name popularly and commercially used as a designation of wine produced from grapes, such as Claret, Burgundy, Hock, Sauterne, Port, Sherry, Madeira, and Angelica, any substance or compound, except pure wine, or pure grape must, or pure grape condensed must, as defined by this Act, and produced in accordance with, and subject to restrictions herein set forth; *provided*, that this Act shall not apply to liquors imported from any foreign country, which are taxed upon entry by custom laws, in accordance with a specific duty, and contained in original packages or vessels, and prominently branded, labeled, or marked, so as to be known to all persons as foreign products, excepting, however, when such liquors shall contain adulterations of artificial coloring matters, antiseptic chemicals, or other ingredients known to be deleterious to the health of consumers; and *provided further*, that this Act shall not apply to currant wine, gooseberry wine, or wines made from other fruits than the grape, which are labeled or branded, and designated and sold, or offered, or exposed for sale, under names including the word wine, but also expressing distinctly the fruit from which they are made, as gooseberry wine, elderberry wine, or the like. Any violation of any of the provisions of any of the preceding sections shall be a misdemeanor.

SEC. 5. Exceptions from the provisions of this Act shall be made in the case of pure champagne, or sparkling wine, so far as to permit the use of crystallized sugar in sweetening the same, according to usual custom, but in no other respect.

SEC. 6. In all sales and contracts for sale, production, or delivery of products defined in this Act, such products, in the absence of a written agreement to the contrary, shall be presumed to be pure, as herein defined, and such sale or contracts shall, in the absence of such an agreement, be void, if it be established that the products so sold, or contracted for, were not pure as herein defined. And in such case the concealment of the true character of such products shall constitute actual fraud for which damages may be recovered, and in a judgment for damages, reasonable attorney fees to be fixed by the Court, shall be taxed as costs.

SEC. 7. The Controller of the State shall cause to have engraved plates, from which shall be printed labels, which shall set forth that the wine covered by such labels, is pure California wine in accordance with this Act, and leaving blanks for the name of the particular kind of wine, and the name, or names, of the seller of the wine, and place of business. These labels shall be of two forms or shapes, one a narrow strip to cap over the corks of bottles, the other, round or square, and sufficiently large, say three inches square, to cover the bungs of packages in which wine is sold. Such labels shall be furnished, upon proper application, to actual residents, and to be used in this State only, and only to those who are known to be growers, manufacturers, traders, or handlers, or bottlers of California wine; and such parties will be required to file a sworn statement with said Controller, setting forth that his or their written application for such labels is and will be for his or their sole use and benefit, and that he or they will not give, sell, or loan such label to any other person or persons whomsoever. Such labels shall be paid for at the same rate and price as shall be found to be the actual cost price to the State, and shall be supplied from time to time as needed, upon the written application of such parties as are before mentioned. Such label, when affixed to bottle, or wine package, shall be so affixed, that by drawing the cork from bottle, or opening the bung of package, such label shall be destroyed by such opening; and before affixing such labels all blanks shall be filled out by stating the variety or kind of wine that is contained in such bottle or package, and also by the name, or names, and post office address of such grower, manufacturer, trader, handler, or bottler of such wine.

SEC. 8. It is desired and required that all and every grower, manufacturer, trader, handler, or bottler of California wine, when selling or putting up for sale any California wine, or when shipping California wine to parties to whom sold, shall plainly stencil, brand, or have printed where it will be easily seen, first, "Pure California Wine," and secondly, his name, or the firm's name, as the case may be, both on label of bottle or package in which wine is sold and sent, or he may, in lieu thereof, if he so prefers and elects, affix the label which has been provided for in Section 7. It shall be unlawful to affix any such stamp or label as above provided to any vessel containing any substance other than pure wine, as herein defined, or to prepare or use on any vessel containing any liquid, any imitation or counterfeit of such stamp, or any paper in the similitude or resemblance thereof, or any paper of such form and appearance as to be calculated to mislead or deceive any unwary person, or cause him to suppose the contents of such vessel to be pure wine. It shall be unlawful for any person or persons, other than the ones for whom such stamps were procured, to in any way use such stamps, or to have possession of the same. A violation of any of the provisions of this section shall be a misdemeanor, and punishable by fine of not less than fifty dollars, and not more than five hundred dollars, or by impris-

onment in the county jail for a term of not exceeding ninety days, or by both such fine and imprisonment. All moneys collected by virtue of prosecutions had against persons violating any provisions of this or any preceding section, shall go one half to the informer and one half to the District Attorney prosecuting the same.

SEC. 9. It shall be the duty of the Controller to keep an account in a book to be kept for that purpose, of all stamps, the number, design, time when, and to whom furnished. The parties procuring the same are hereby required to return to the Controller semi-annual statements under oath, setting forth the number used, and how many remains on hand. Any violation of this section, by the person receiving such stamps, is a misdemeanor.

SEC. 10. It shall be the duty of any and all persons receiving such stamps to use the same only in their business, in no manner or in nowise to allow the same to be disposed of except in the manner authorized by this Act; to not allow the same to be used by any other person or persons. It shall be their duty to become satisfied that the wine contained in the barrels or bottles is all that said label imports as defined by this Act. That they will use the said stamps only in this State, and shall not permit the same to part from their possession, except with the barrels, packages, or bottles upon which they are placed as provided by this Act. A violation of any of the provisions of this section is hereby made a felony.

SEC. 11. This Act shall take effect and be in force ninety days after its passage.

This law goes into effect and becomes operative on June 5, 1887.

In section ten of the above law will be found the following:

"It shall be their (those employing the stamp) duty to become satisfied that the wine contained in the barrels or bottles is all that said label imports."

As there are many dealers who will employ the stamp on wines, bottled or packed by them in small packages, which wine they receive from others in larger packages, coming to them covered by the State stamp of purity, the question arises as to the liability of such bottler and what would constitute, in the eye of the law, the "duty" of the said bottler in determining that the wine employed was true to label.

The answer to this question has been kindly furnished to me as follows, by Attorney-General Johnson:

SACRAMENTO, May 19, 1887.

J. H. WHEELER, Esq., 204 Montgomery Street, San Francisco:

DEAR SIR: Answering your inquiries as to the Act to prohibit the sophistication and adulteration of wine, etc., approved March 7, 1887.

You make a hypothetical case for my opinion: "A buys an adulterated wine from B, with a pure wine stamp over the bung. A bottles the wine and puts the pure wine stamp on the bottle, believing the wine to be pure. Subsequently the wine is found to be not pure. Is A then liable?"

It won't do for A to trust implicitly B or his stamps. The Act requires some diligence on A's part. It says that it shall be his duty to become satisfied that the wine contained in the barrels or bottles, is all that said label imports as defined by this Act.

A therefore must not be guilty of criminal negligence. That would be as bad as if A's intent was to palm off adulterated or impure wine.

But if A makes a reasonable effort, in good faith, to satisfy himself that the wine is all that the label imports, and is satisfied, after using due diligence, he would not be guilty of a misdemeanor, if he was mistaken or imposed upon. It is the good faith of A, and the use of due diligence and scrutiny in his investigation, which the law requires. I do not think an analytic test is necessarily required to be applied by A. That might not at all times be practicable. But he must recollect that there is a duty cast upon him to satisfy himself by available and reasonably reliable means that the wine is what the label imports, and he must be satisfied.

An analysis, however, would be the most satisfactory way to test the wine.

Very truly yours,

G. A. JOHNSON,
Attorney-General.

Other than this the law seems to be sufficiently clear to need no further explanation. Particular attention is called to Section 6, which renders the sale of anything purporting to be wine—in the absence of a written agreement to the contrary—void, and the vender liable for damages if it be not pure as specified in the law. According to the framers of this law, this, whether it bears the pure wine stamp or not, is the effective clause, and, coupling with it the liberal recompense to the informer and the prosecuting attorney, we have incentive sufficient to greatly facilitate its enforcement.

WINE ANALYSIS.

Whenever it becomes necessary or desirable that a wine be analyzed for the benefit of a dealer, vine grower, or any person whatsoever, pursuant to the enforcement of the above law, a sample of the same may be sent to the Secretary of the Viticultural Commission, by whom an analysis will be procured from the State Analyst and a ready report made as to its purity. The machinery for this latter work was obtained in an Act passed by the State Legislature entitled: "An Act to provide for analyzing the minerals, mineral waters, and other liquids, and the medicinal plants of the State of California, and foods and drugs, to prevent adulteration of the same. Approved March 9, 1885."

This law provides that the Governor of the State shall appoint one of the Professors of the University of California as State Analyst, whose duty it shall be to analyze all articles of food, drugs, medicines, medicinal plants, etc., manufactured, sold, or used in this State, when the same shall be properly submitted to him. The law then prescribes the methods by which the samples of various articles shall be obtained and submitted for analysis, and specifies that the Board of State Viticultural Commissioners shall have the privilege of submitting to the State Analyst samples of wines, grape spirits, or liquids or compounds in imitation thereof, for analyses, as follows:

Any person desiring an analysis of such products may submit the same to the Secretary of the State Viticultural Commissioners, who will transmit them to the State Analyst in the manner prescribed. The analyses shall be made and the certificate of the same shall be forwarded to the Secretary of the Viticultural Commission. This certificate, as the law reads, shall be held in all Courts of this State, as *prima facie* evidence of the properties of the articles analyzed by him.

Thus it may be seen that there lies within the reach of every wine maker or dealer, an easy means of obtaining, without expense, uncontrovertible evidence, wherever fraud is supposed.

Unfortunately, this law appropriated no money for the carrying on of the work required. Realizing the importance of such a bureau and its maintenance, however, the Viticultural Commission has shared its endowment with the State Analyst, and will continue to do so, in order to lend all of the aid they can to the support of the law. Pursuant to the requirements of the Act, W. B. Rising, Professor of Chemistry at the State University, was duly appointed State Analyst. An assistant has been employed, and he is now ready for and engaged in the examination of wines, the purity of which can be quickly determined and the report made available in a few days after delivery of the samples to our Secretary.

Concerning the expense of maintaining the State Analyst's Bureau, it is hoped that the Board of Regents of the University, in their manifest desire to aid the cause of viticulture, and in view of the liberal endowment made

them in the last Legislature, will come to the assistance of the Commission in the support of the analytical work.

THE STAMPS.

Section seven provides that on application the necessary stamps shall be furnished by the Controller.

Here again, the Legislature made no appropriation with which to purchase the plates necessary for printing the stamps, and the liberality of the Viticultural Commission is drawn upon, they having consented to supply the first cost.

One hundred thousand stamps have already been printed by the State Controller, and will be ready for distribution when needed. Their cost will be \$1 50 per M. with expense of delivery added. The stamp for bottles may be easily affixed thereto; that placed over the bung of a barrel will need the protection of a piece of tin such as is ordinarily affixed to the bung of a barrel previous to shipping.

The following committee of vine growers, to see to the enforcement of the law, has been appointed by H. W. McIntyre, President of the State Vine Growers and Wine Makers' Association: Hon. M. M. Estee, Napa; J. B. J. Portal, San José; Captain Chamon de St. Hubert, Fresno; J. H. Drummond, Glen Ellen; H. A. Pellet, St. Helena; Jacob Schramm, Calistoga; H. A. Meriam, Los Gatos; B. H. Upham, San Francisco; A. Erz, Anaheim; Julius P. Smith, Livermore. To these others will be added soon. This committee will proceed to collect miscellaneous samples of wine found throughout the city and State, which, if proving spurious, will be turned over to the District Attorney, and the case submitted to the Courts.

The Pure Wine Act, at the time of its passage by the last Legislature, was the subject of considerable criticism and dispute.

It was discussed at great length before the public: but, having ended in adoption and approval, it is to be hoped that the little inconvenience it may make a few will be amply compensated for by its good effect on the general industry. If it opens the way to any fraud we may be sure this clause will be used by the enemy, to counteract the effect of which every good feature of the law must be brought into requisition.

Many demanded the use of certain materials in preparing wine, which materials to them seemed harmless, but which had to be denied, in order to exclude other more damaging adulterants. For example, we may well afford for the market within our own State to abandon the use of ordinary grain spirits in fortifying wines, if, by the law, we are able to stop the extensive and unhealthful practice of stretching, produced by the same means.

Nor must we forget the effect of this Act in enlarging the demand for grape spirits, and thereby causing the distillation of poor wines, which would otherwise be fortified by neutral spirits, and usurp the place of better wines. By this Act a native spirit is substituted for an imported one.

The healthful effect of our wines, and a consequent increased local consumption, will be greatly promoted by substitution of grape spirits for cheaper poisonous spirits.

Several have already indicated their intention of using the State stamp on small packages. On bottles, particularly, will the practice be adopted, and here it will be of use. When the public demand the pure wine stamp on the bottles, as they will do when knowing its value, and finding some merchants who employ it, the trade will be forced to supply them pure wine, and that under a California label. A large portion of the native

wine sold in bottles goes to-day to the public with a fictitious label of foreign import. The presence of the stamp will bring to public recognition the name and trademark of California producers, where heretofore the bottle has been branded "Chateaux La Rose," "Chateaux Margaux," or "St. Julien."

Whether the use of the stamp on large packages going out of the State will be harmful or otherwise, the use of the same on bottled wines must certainly result in good.

It has been suggested that the Controller's list of those dealers making application for the stamp will prove a valuable directory for the use of purchasers. It is to be hoped it may.

Dealers have now had ample time for working off their suspicious products; and every opportunity has been given those who—perhaps with honest motives at first—have been forced into the use of cheapening processes by harmful competition, to start anew on a fair, square basis, with an easy redress from others competing by dishonest means.

Whatever effect this law may have, it will aid in forming a standard of excellence founded on quality, and not alone on price. The latter has proved the ruinous measure by which our wines have been gauged and marketed—a measure by which they have been caused to degenerate rather than advance. Good wine continues to improve, and will pay to keep. Poor wine will rapidly deteriorate, and if not allowed to be drugged, must go either to the distillery or to be made into vinegar.

If this law becomes effective, which depends mainly on the patronage of the wine-drinking public, it will double the California market for good wine. Its success will send the poor wine to the distillery, the sale of which has dragged down the price of the better product to ruinous figures: figures which preclude the possibility of marketing any choicer grades for the general public.

CIRCULAR OF INSTRUCTIONS TO INSPECTORS.

STATE OF CALIFORNIA, BOARD OF STATE VITICULTURAL COMMISSIONERS.)
OFFICE OF THE CHIEF EXECUTIVE VITICULTURAL OFFICER,)
SAN FRANCISCO, June 25, 1887.)

DEAR SIR: By resolution, unanimously adopted at a meeting of the Board of State Viticultural Commissioners, held on the thirteenth instant, the Chief Executive Officer was instructed to issue a circular to all local resident inspectors throughout the State, calling upon them to report, promptly, to this body, whenever they discover any violation of the pure wine Act in the employment of materials forbidden by this law to be used in the manufacture of pure wine.

I take the earliest opportunity of communicating to you this wish of the Board; and, although hoping you may never be called upon to report any transgression of the new law, I trust you will not hesitate to do your duty as an officer of the Board when occasion may require.

Yours, very respectfully,

J. H. WHEELER,
Chief Executive Officer.

BLEACHING SEEDLESS SULTANA RAISINS,

BEING

Appendix 3 to the Annual Report of the Chief Executive Viticultural Officer
FOR THE YEAR 1887.

The area planted to the Seedless Sultana grape in California was greatly augmented in 1881, 1882, and 1883, during which time it was in great favor with many. After 1884 the planting of this variety nearly ceased, and it is not at present a popular grape for either wine or raisins. The market is easily glutted with its raisins, and the wine has, with few exceptions, proved other than satisfactory. Prominent among other objections has been its tardiness in coming into bearing—generally this variety must have attained the age of at least five years before it sets a good crop. When once well in bearing, however, it is regular and very prolific; it has been known to produce as much as fifteen tons per acre.

The extensive plantations of Sultanas made at first are now coming well into bearing, and the matter of preparing the raisins for market is one of considerable interest and inquiry. Letters have come to me asking for full instructions as to the best methods of bleaching, drying, and marketing the grapes.

The imported Sultana raisins come to our markets bleached; they are translucent and nearly colorless—more so than any I have yet seen prepared in California. These command better prices than the domestic Sultanas. Bleaching and drying these raisins has been carried on here by a very few, and their experiments have been limited. Some good results have been obtained, and it is the experience which has grown out of these successes which I am here able to produce.

Mr. W. B. West, of Stockton, has been the early pioneer in the matter of Sultana raisins, having cultivated this grape for upwards of twenty years. In drying them he was first to employ bleaching, the details of which he had learned in Europe, and, after a trial, he communicated his experience to Messrs. W. T. Coleman & Co., who have since furnished this, together with other information, to some of their customers.

Prominent among others who have prepared bleached Seedless Sultana raisins are Jackson Brothers, N. Wyckhoff, and Wm. Forsyth.

I give, in the following directions for the work, the latest instructions produced by the commission house of W. T. Coleman & Co., together with such changes and additions as have been suggested by Mr. W. B. West and Byron Jackson. These gentlemen have kindly assisted me in the matter.

DIRECTIONS.

For the best results the grapes must not be picked until they are fully ripe. This is indicated, in bunches not too much shaded, by the bright amber color of the skin, which, however, fails to appear in grapes hidden from the light and sun. A certain determination of full ripeness may be had by pressing the clear juice from the grapes thought to be ripe, on each of several successive days, at each pressing determining the sugar by means

of a must scale, and when the amount of sugar shows no increase from day to day, the grapes are ripe. In making these tests care must be taken that no bad bunches enter the samples, as whole bunches of Sultanas are sometimes found which never sweeten; these should be carefully excluded throughout the treatment.

More care is necessary in determining the perfect ripeness of the Sultana than is the case with the Muscats, as when at all green the large amount of acid so common to this variety renders them almost valueless. Even when drying, the bunches, being large and dense, should be carefully examined to see that they are ripe throughout.

Before picking, everything should be in readiness for bleaching. The necessary preparations are as follows:

A kettle, or kettles, holding twenty gallons or more, proportioned to the amount of work to be performed, should be ready to heat up. The work of dipping the grapes into the lye solution may be done in the kettles, if necessary, but for convenience it is best to have a wooden trough built at which a number of persons can work. This trough should be provided with a sheet-iron bottom, and built over a brick fireplace, such that the heat of the solution may not be lowered by the dipping.

The lye solution used thus far in California has been made of concentrated lye, dissolved in water just below the boiling point. In Smyrna, however, the practice has been to use instead of concentrated lye, consisting in our market of impure and variable caustic soda, the potash lye obtained by leaching the ashes produced by the burning grapevine brush. The superiority of the imported Sultanas would hence lead us to infer that potashes, which is the alkalic obtained from ashes, or better still, the pearl-ashes, which consist of purified potashes, could be substituted for concentrated lye to advantage. The last named potash salt is dearer than any of the others, but the quantity consumed is so small that no hesitation should be had in substituting this clean and wholesome salt for the soda salt, so uncertain in composition, and impure. Another advantage growing out of the use of pearlashes would be that of preserving the raisin in a soft, jelly-like condition, with a clear, glossy skin, more inviting far than the dry, chip-like raisin sometimes produced by the overdrying of raisins dipped in caustic soda.

The proportions recommended and employed heretofore have been: one pound of concentrated lye to five gallons of water. To make an equally caustic potash solution would require about one and one half pounds of pearlashes to five gallons of water. The price of pearlashes, which consist of pure carbonate of potash, varies from eight to ten cents per pound, according to quality.

Another indispensable provision is to secure facilities for rinsing the fruit in cold water immediately on its removal from the hot lye solution. The best rinsing may be done in running water, but when this is not practicable a barrel or tank may be used, care being taken to renew the water frequently in order that it may not become so charged with the lye as to improperly perform the rinsing.

A dripping rack may be had above the trough or tank by placing cleats or strips across, on which the trays may stand a few moments after removing from the bath. They should be well drained when removed from the rinsing water, otherwise a drop will form and dry up on the under side of the raisin, leaving a dark spot when cured.

To add to the soft, glossy appearance of the skin, a quantity of pure olive oil should be provided, which may be added to the dip on which it floats. The oil for this purpose should be pure. To insure purity it is

safest to use oil produced in California. Glycerine is highly recommended for the same purpose—some claim that it is superior to oil, and being cheaper may be used more freely.

The apparatus being in readiness, and the grapes ripe, the lye should be put in solution and heated. The potashes being all dissolved, the oil or glycerine may be added at the rate of half a large spoonful now and then as it disappears on the grapes. If oil be used, the proper amount will give to the solution a distinct amber shade.

As little time as possible should elapse between the period of picking the grapes and that of dipping the same. A great deal depends on this, as any delay in getting the grapes into the lye will make the work more difficult and the result more uncertain.

Some recommend picking the grapes in baskets or buckets of perforated tin, in which, without transfer, they may be immersed in the dip. Mr. Jackson places the grapes on a tray made with a frame of iron, which is covered with wire gauze with one quarter-inch mesh. The frame projects upwards on the sides to prevent the fruit floating off when in the dip, and is made to receive, as a cover, the wooden tray on which the fruit goes to the drier. When dipped and rinsed, the wooden tray is placed over the dipping and two men transfer the fruit by turning over the two. This system I believe is superior to all others, and economizes time and labor in the curing.

The time which the grapes should continue in the dip will vary with the locality. In some districts they possess thick skins, thus requiring a longer submersion than when the skins are thin and delicate. From one to two minutes is the prescribed time—experience and observation are the best guides. The dipping causes the skin of the grape to crack, at which time they are dipped enough and should be removed.

After dipping and a moment's draining over the trough, they should be rinsed thoroughly by immersing them in the pure water of the rinsing trough, after which drain well, long enough to allow all of the water to run off which will run off. After transferring as above, the drying may be conducted as for other raisins.

If the drying be conducted in the open air, and the heat of the climate will permit, the trays should be stacked immediately one above the other, up to a convenient height for handling. Sultanas dried thus in the shade will profit much more by the bleaching than if exposed to the direct rays of the sun. A building through which the draught draws strongly and warm is the best for open air drying.

When the drying is complete, the bunches should be gently rubbed over a sieve with fine meshes, to remove the stems, which will then come off readily.

When thus finished, the raisins should be packed in regular raisin boxes, which, according to W. T. Coleman & Co.'s instructions, should contain just twenty-five pounds, net weight. Use only one plain single paper wrapper around them all. Over the top face of the raisins, between them and the leaves of the paper wrapper, insert a piece of confectioner's wax paper; this done, your product is ready to enter the market in competition with those similarly prepared in Smyrna.

Besides adding to the appearance of the Sultana raisin, this operation increases perceptibly the weight of the finished product, greatly bettering it by the moisture-retaining power of the potash.

The process of bleaching, I am informed, adds 25 per cent to the selling price of the raisins. Messrs. W. T. Coleman & Co. put the profit a little

lower than this. Such being the case, those drying Sultanas cannot afford to long avoid the simple addition of the bleaching process.

Bleaching as applied to Muscat raisins, has never become popular in this country, nor is it certain that any common preference could be formed to make the process common. There are those who prefer bleached Muscats, and we already find quite a market. Their preparation is therefore worthy of the attention of some of our growers and curers of the Muscat.

The most beautiful, large seeded, and high priced raisins prepared in Smyrna, are bleached as above, and make a most inviting fruit. Well prepared, I believe they would form a novelty, which would prove profitable at least in limited quantities.

HOW TO AVOID AND CORRECT IMPERFECT FERMENTATION,

BEING

Appendix 4 to the Annual Report of the Chief Executive Viticultural Officer

FOR THE YEAR 1887.

The number of grape growers who have this year become wine makers for the first time warrants the publication of a few rules for the management of troublesome fermentation. Dry seasons are particularly productive of what, in California wine makers' parlance, are known as "stuck wines." These are wines which fail either in commencing or completing their fermentation.

TO START FERMENTATION.

Wines which are slow to commence fermentation are easily started. This trouble occurs most commonly with the first grapes crushed, particularly where they lay exposed to the chilling effects of a cold night and are crushed early in the morning, before being again warmed by the sun. The must is then apt to lie dormant in the fermenting vat for several days before the germs show any healthy action. The same delay in starting is sometimes produced in grapes crushed for white wines, when the must is run into the barrels exposed out of doors over night, thereby becoming cold. The delay in starting these cold musts is seldom productive of any great evil; but the annoyance and loss of time caused thereby may be completely avoided by crushing the grapes when warm, and then protecting the must against any considerable reduction in temperature.

The temperature most favorable to the action and development of the yeast germ ranges between 75 and 85 degrees. The fermentation would, therefore, be greatly aided in starting by bringing the new must to this degree of heat, and maintaining it thus until a good, healthy action prevails, after which the heat produced by the ferment will be sufficient.

If the grapes have been chilled before crushing, it is well, in addition to the warming, to add a little clean, fresh yeast. The best for the purpose is the compressed yeast, sold in small cakes throughout California; although any well-washed fresh yeast will do. Some wine makers always introduce this yeast into the first must to insure a prompt commencement.

Once the yeast plant gets established in any vat of the fermenting room it readily takes possession, unaided, of all the must subsequently introduced.

There are some wine makers, however, who insure a prompt start of each vat after the first, by mixing in some of the lees or yeast of a working or previously finished must.

To raise the must to a suitable temperature, a steam coil may be used. In districts where the sugar runs high, the steam is blown directly into the must by means of a hose, the opening of which is placed within and near the bottom of the tank. Where steam cannot be had, portions of the liquid may be heated successively, and returned to the vat or cask, until the whole marks 70°, or over. In doing this, the heated portions should not reach a temperature exceeding 125°. Under peculiar circumstances

the yeast plant will stand a temperature approaching 140°, but it would not generally be safe to heat it above 125°.

Very low temperatures, if not changing too suddenly, do not destroy the yeast plant, but render it temporarily dormant and unproductive.

Some wine makers deprecate the use of yeast as injurious. I have yet to learn, however, of any deleterious results accruing therefrom. Some even resort to a handful of grape leaves, or other material claimed to assist the must in starting.

MUSTS HIGH IN SUGAR.

The trouble in starting the first vat is small as compared with what often comes later, especially when the weather is dry and hot, or when the must shows 26, 28, or 30 per cent of sugar. Then comes the new wine makers' trial, and with old ones, too, the trouble not infrequently begins.

Without attempting to explain the causes which may lead the wine to cease fermenting, I will proceed to state the best and commonly adopted methods of avoiding the trouble, and the best methods of finishing wines "stuck" with from 2 to 8 per cent of sugar.

When the season is dry, and the must marks over 24 per cent saccharine, especially if the atmosphere seems wanting in moisture, and there is an absence of dew, fog, or rain, the utmost care should be exercised to avoid any other causes liable to obstruct fermentation in red wine.

SHALLOW VATS.

Shallow vats are invaluable for disposing of troublesome red musts, principally because of the ease with which the same may be worked and aerated; also, because the mass is so spread out as to avoid the excessive accumulation of heat.

For these reasons cement vats are preferred in many of the southern districts of Europe, where wine makers are similarly troubled.

These vats are made large and shallow, so that the must may be continually stirred and worked over. The cement answers better than wood, as it serves to carry off the heat which accumulates too rapidly in some districts of the South. Some wine makers, I have learned, ferment commonly in wood, but have their cement vats, to which the "stuck" wines are relegated when they chance to occur.

Next in value to a shallow vat is a shallow mass in a deeper tank, which serves somewhat to alleviate the impairment of the ferment, but this is never equal to the shallow tank in seasons of excessive sugar.

THE USE OF THE STEMS IN FERMENTING.

Fermenting on the stems aids the process, and may be safely adopted in red wines, if they be found ripe enough. When the butt of the stem is brown and woody, and the whole possesses a tough and wiry appearance—not green, brittle, and sappy—it may be safely added, and will aid greatly in avoiding trouble later on, though increasing somewhat the work of stirring.

Much difference in opinion prevails as to whether the use of the stems improves the wine or not, and this, too, among competent wine makers; some ferment all red wines on the stems, while with others they are never employed. The best authorities, however, agree on their value, being governed by circumstances, the season, ripeness of the grapes, etc., as to the quantity to be used. In the case of troublesome wines which we have

under consideration, it is doubtless best to employ part or all of them. They are needed not only to assist fermentation, but to increase the acid of the wine—wanting usually in this respect in seasons of overripeness. Such wines, too, can safely stand some of the harshness arising from the stems, which will also give them keeping quality.

I should never counsel the use of stems that are green, brittle, and sour, but as those seldom accompany troublesome seasons, they need hardly be mentioned.

BLENDING IN THE FERMENTING VAT.

The fermenting together of different varieties, or of the same variety from different soils, is a method well to adopt in seasons when trouble is apprehended. Red grapes generally ferment better when ten, or more, per cent of white grapes are added. The fine wines of Europe are often made in this manner, the quality being improved by the process.

If, for fear of losing color, or other reasons, the white grapes cannot be had, the blending of two or more varieties of red grapes will prove healthful to the ferment, and will make, too, a valuable blend if mixed intelligently with a previous knowledge of the qualities of each, and their appropriate proportions.

In filling the vats, if the first crushing runs high in sugar, the balance should be made up of grapes running enough lower to bring the whole to a medium strength.

PROPER MATURITY.

It is difficult to indicate the exact degree of sugar desired in all cases, in that it should be governed largely by circumstances. It is safe to say that wines seeking an early market will profit by all of the sugar which can be fermented out. Wines lacking in color will be improved by as complete maturity of the berry as is possible to ferment dry; in fact, there is everything in favor of complete maturity of the grape, except the difficulty produced by its fermentation. Not only does it become difficult to manage the fermentation, but when too high in sugar, the wine resulting, though apparently dry, may possess sugar sufficient to trouble it for years after.

These considerations must all be known in limiting the maturity of the grape, and in determining at what degree they should be picked.

By a little attention to the mixing of the grapes at time of picking, all of the good qualities may be obtained in a single vat, each lot performing its proper function. Not infrequently, however, we find varieties picked and fermented separately, each making a wine which possesses some excess or defect, but which would be corrected by judicious blending with some other variety or lot, possessing a corresponding defect or excess, be it color, acidity, strength, or harshness.

FERMENTING WITHOUT CRUSHING.

Where there is any promise of trouble in fermentation some wine makers resort, with red wines, to what is known as the "Morel process," viz.: that of placing the grapes directly in the tanks without either stemming or crushing. The mass is stirred and worked an unusual amount to start fermentation, which then continues slow and uniform, and usually finishes without trouble. The greatest objection urged to this method is, that in the subsequent pressing of the pomace, some grapes that were not ripe enough to ferment and break, are here opened, and contribute a certain amount of sugar to the liquid, by this time supposed to be dry. Drawn into sulphured

tanks or a cool cellar for keeping, this sugar manifests itself later on, to the great annoyance of the maker and detriment of the wine. This objection may, however, be overcome by arranging to continue fermentation of the wine when pressed, or, better still, by keeping the press wine separate for further fermentation, or brandy making, retiring only that to the keeping cellar which comes off without pressing.

Be it known that this process conduces to slow, uniform, and complete fermentation of just those berries which are ripe enough to make the best wine, and that this drawn off without pressing separates the better from the poorer wine. The method is by no means common, though it has afforded satisfactory results in many cellars, and proved an efficient preventive of tumultuous and incomplete fermentation.

Stemming without crushing has often been substituted for the Morel process, and with best results, in that, by the breaking of the riper grapes, it starts a uniform fermentation from the commencement.

WATERING THE MUST.

As a last resort, when the must marks 28 per cent of sugar, or over, water may be used for extending the same. This method is recognized as legitimate by the Pure Wine law of California. It is employed freely by some vineyardists, and authorized by many good authorities. Others there are who contend strongly against it, and there are laws in Europe prohibiting it.

Without entering into a discussion, as to its merits or demerits, I should advise that musts, showing too high a percentage of sugar, should, in the absence of other and better remedies, be reduced with pure fresh water, or else fermented with a view to making port wine.

The addition of water alone to high musts will not always insure perfect fermentation, as many people suppose. To obtain the best results, however, the water should be added as soon as the grapes are crushed, and it should be then well incorporated with the mass—bearing in mind that the addition of this, as of any other substance not coming directly from the vine, should be used only as a last resort. To extend the must with water, it is found that about five gallons of water are required to reduce the must from a ton of grapes, 1 per cent in sugar. For example, to reduce one ton of must from 28 per cent to 25 per cent would require about fifteen gallons of water.

Concerning the use of water in extending the must, I have found that wines so produced do not possess the keeping qualities found in others. Acetic fermentation sets in immediately on the opening of the bottle or package.

OTHER AIDS TO FERMENTATION.

Enotannin and cream of tartar are employed by some to assist fermentation, and are valuable for either white or red wines. These substances produce, it is claimed, desirable qualities in the wine, and improve the color of red wines. Their use is permitted and recognized by our law as harmless. When employed for red wines, they should be sprinkled over the must at the time the grapes are crushed, at the rate of two ounces of enotannin and one half pound cream of tartar to each ton of grapes. Thus used they have been found to make the fermentation regular and uniform, and will cause the wine to clear readily when drawn off.

STIRRING THE MUST.

Complete and constant stirring forms a valuable adjunct to fermentation at all times; particularly is it necessary when the must is hottest and most active. The measure of success is not infrequently determined by the amount of working over the wine receives. In working red wines in high tanks, this is done with a tool made of a piece of scantling about six feet long, enlarged by cross-pieces, or even cleats, nailed on at the lower end. A cross-piece answers for a handle at the top. A close-tined stable fork, or other more effective tool, may be employed if the tank be shallow and the must is not too deep.

THE "STUCK" TANK.

If selecting and adopting in advance of the work proper precautions, as above described, there is seldom cause for further trouble.

There often occur, however, through carelessness or otherwise, tanks "stuck" at from 2 to 8 per cent of sugar. The wine has commenced fermenting all right, has boiled up tremendously, to the intense delight of the maker: when, lo! on coming out the next morning, the cap has dropped: the wine has become inactive and cold; the bubbles have almost ceased to rise, and yet the must marks several degrees of sugar remaining.

There is one common and usually effective proceeding to start up fermentation.

The wine, or partly finished wine, if for claret, should be drawn off, and the pomace pressed and rejected, or sent to the distillery. Let the wine so drawn be placed in two or more tanks, and an equal bulk of fresh grapes added. For the best results the grapes added should be, if possible, some variety known to produce good fermentation. See, too, that they are low in sugar. If such grapes are not available, secure the same variety from some other locality or soil, taking care that they are as low in sugar as possible—but not green.

The desired result has often been obtained by drawing the stuck wine directly on to newly crushed grapes of the same kind, and from the same place; but there is greater assurance of success when the variety or locality is varied somewhat, and the grapes chosen are lower in sugar. White wines should be pumped on to new must in a similar manner.

ERRORS OF BEGINNERS.

New wine makers are prone to fall into the error of only half doing the work of refermenting by adding a few boxes of fresh grapes to the stuck tank, expecting thereby to complete fermentation. This has been known to succeed in rare cases, when the trouble was light and the variety added was Berger or some other—noted alike for its low saccharine and favorable fermenting qualities. Generally, however, it is time thrown away to do other than what I have indicated at first, viz.: If red wine, draw off the wine, press and reject the pomace, and commence fermentation on newly crushed grapes. If this fail—which it will do but rarely—the maker can try the same again, employing fresh grapes of some other variety, still lower in saccharine, and combining all of the precautions indicated in the first of this article; or, if these latter are unsatisfactory, it may be necessary to reduce the newly mixed must to about 24 or 25 per cent sugar by the addition of water. If all of these fail there is left no alternative but to

make port wine, or send it to the distillery. There is rarely any necessity of this latter extreme if the first instructions I have given are followed.

In place of pumping the stuck wine on to new pomace some wine makers prefer to let the fermentation finish in casks or tanks. This it will do if small packages be employed and they be kept in a favorable temperature. Nothing, however, is so certain of good results, nor so frequently practiced, as the method of renewing fermentation on new pomace, or new must, if for white wine, and finishing the wine up before the final drawing or pressing.

I have not attempted here in this hurriedly prepared article to explain the reasons why these troublesome fermentations occur. There are many theories as to their causes, and great difference of opinion exists unnecessary for me to discuss at this time. We know the circumstance under which the troubles usually occur and the methods of their avoidance. These methods—most of them well known to old wine makers—I have aimed to present at this appropriate moment. This is done more in view of keeping the inexperienced out of serious trouble by artificial means than of explaining the causes of the natural phenomena which occur as they have in times past, or may occur in the future.

J. H. WHEELER,
Chief Executive Viticultural Officer.

VITICULTURE IN THE SOUTH OF FRANCE.

REPORT OF A. HERISSON, INSPECTOR OF AGRICULTURE; BEING A TREATISE ON THE PRESENT AND MOST APPROVED METHODS OF COMBATING THE PHYLLOXERA AND THE COMMON FUNGOID DISEASES OF THE VINE.

Translated from the French by J. H. WHEELER, and forming

Appendix 5 to the Annual Report of the Chief Executive Viticultural Officer
FOR THE YEAR 1887.

NOTE.—The following document I have deemed advisable to translate as bearing on the warfare against vineyard enemies already begun in California. Our vineyardists have already commenced to discriminate between the stocks mentioned in the last of this report, as to their value for different soils, and not a few are doubting the value of resistentes, generally because of the failure of certain varieties planted in inappropriate soils. These will be greatly set at rest by a study of the following, which, although the experience of a year ago, is equally valuable for the present. That part of the report relating to submerged vineyards will, I trust, prove of special interest and assurance to vineyardists belonging to the irrigated districts.

J. H. WHEELER,
Chief Executive Viticultural Officer of California.

The year 1885 terminated with the discovery of remedies for downy mildew (*peronospera*), which left the vineyardists full of hope. During the year 1886, the success of the remedies proposed has been fully established by experience. The region of the south, already punished severely by the phylloxera, has, however, been scarcely spared by the cryptogame. An abundant harvest was once predicted, but, unfortunately, rains fell which promptly removed this illusion. Certain vines grafted on American stocks proved weaker than has ever before been remarked.

The distinction which I established between the different means employed for combating the phylloxera, in my report of last year, remains unaltered this year. Throughout the country it is proclaimed that the submerged vineyards have furnished such good wine this year, that they may be considered quite as advantageous as plantations made in sand.

PLANTING IN SAND.

The planting of vines in sand continues popular, but these soils are becoming scarce and high priced. Some that are sold for planting are, after a few years, found useless. For instance, each year some vineyards, planted in sea sand, and arriving at a certain age, are observed to weaken suddenly, and finish by dying. This is caused by the roots, which, after passing through the sandy soil, penetrate a salty subsoil, or one soaked with the salt water, and perish. Care must therefore be observed where this resort is had, to avoid low or salty places. The varieties commonly planted in sand are heavy producers: *e. g.*, Aramon, Petit Bouchet, and

Carignane. The produce of these vineyards during the past season has averaged about seven hundred and twenty gallons of wine, or five tons of grapes, per acre. At the harvest, this wine is sold at about 21 cents per gallon. The selling price of these full bearing vineyards planted in sand is at the rate of \$500 to \$600 per acre.

Submerged vineyards have this year given magnificent results. For example, the vineyard of Grand Crabouls, near Narbournne, belonging to M. Gautier, have produced from one hundred and five acres, one hundred and ninety-two thousand five hundred gallons of wine, or about thirteen tons per acre. Of these there are fifteen acres planted to Petit Bouchet, which have yielded fifteen tons per acre. The wine was sold at 25 cents per gallon, thus yielding over \$500 per acre; placing the cost of working and flooding at \$80 per acre, a net return of \$420 is had. From this showing comes a ready explanation of the great interest created in the South for irrigating canals. It also confirms the good judgment of the Government in undertaking to construct new canals in l'Ande. It is to be regretted that other districts favorably situated for canals should not have been able to avail themselves of the same remedy before. When the work of canal making is done by the Government, no extra expense is necessary in advance by the vineyardists, who, in the beginning, have expense enough; but who, when once the plantation becomes productive, is ready and willing enough to pay for the use of the water a liberal percentage of the returns he realizes (in this case amounting to fifteen per cent of his profits). This percentage yields to the Government a valuable income, after the expense of construction has been all made good.

SUBMERGED VINEYARDS.

Submersion is alike valuable for American vines as for non-resistant European varieties. The Lenoir has acquired a most extraordinary vegetation when flooded, and has produced as much as ten tons per acre, owing probably to the roots being thereby completely freed from the phylloxera and its damaging effects.

Some submerged vineyards planted in loose permeable soil have suffered invasion from the phylloxera, and summer-watering has been resorted to, to dissipate the evil. The latter proceeding has furnished excellent results, and cannot be too highly recommended in a general manner: in addition to relief from the phylloxera the vigor and fructification of the vine is greatly augmented. Certain proprietors make a supplementary submersion in April and in May, at the time when spring frosts are expected and feared, the process preserving them perfectly from loss.

Few failures are known where submersion has been practiced: still it is best to rely on this remedy for phylloxera only on soils but little permeable. When passing quickly through the soil and off, air enough is admitted to prevent perfect asphyxiation of the phylloxera.

Vineyards planted in view of submersion are usually devoted to heavy producing varieties, namely, the Aramon, Petit Bouschet, and Carignane. The production has this year attained an average of one thousand three hundred gallons per acre in well managed vineyards. The wine has been exceptionally good, selling at 21 cents per gallon. The value of vineyards arranged for submersion is placed at about \$800 per acre, varying somewhat with the location. The annual expense of submersion alone is from \$12 to \$16 per acre.

SULPHIDE TREATMENTS.

Treatment with the sulphide of carbon is held in the same esteem as in years past. It is employed principally in preserving old vineyards—no new plantations are made with a view to protecting them by means of this remedy. With it the vineyardist hopes only to maintain the production where the soil is sufficiently loose and deep. It, as in earths like those of the Vistre Plains, or those near Mimes, which appear to unite the conditions most favorable for the treatment with sulphide of carbon, and here it sometimes fails. In compact soils we can only hope to prolong for some years the existence of the vineyard. Treatments made with this remedy are now mostly applied by means of a plow constructed for the purpose. The sulpho-carbonate of potassium has lately been almost entirely abandoned in this region, and is followed by the employment of sulphide of carbon, dissolved in water, the results of which are said to be quite as good, and produced at much less cost. This solution is employed at the rate of one gramme of sulphide in winter, and a half a gramme in summer, to a quart of water. A mechanic in Aude, Mr. Fafeur, manufactures a simple and ingenious instrument, by means of which the solution may be prepared with great exactness and with all perfection desirable. It is quite essential for this treatment, that the mixture should be intimate and uniform, a result obtainable only by a special apparatus. The quantity of solution employed for each vine is eight or ten quarts. This method of treatment has developed to a great extent in l'Aude, where it is employed to defend all the vineyards newly attacked.

AMERICAN VINES.

American vines, which appeared triumphant over all methods in 1885, have, in 1886, entered on a critical period, one with which all viticulturists are occupied. Certain grafted vines, limited in number as yet, have given at the end of Spring manifest signs of decline. The characteristics of the evil have been nearly everywhere the same—want of vigor, frequently associated with chlorose of the foliage. These two manifestations are observed in all degrees, grading from vines merely attacked, to vines at the point of death. Generally, in the vineyards so afflicted, the vines are not all attacked in the same degree. There are zones and plots where the malady is more intense, and within the spots most afflicted some vines may often be observed which seem to resist this weakness. It is not more uniform than were the phylloxerated spots. If any resistant vines are found, which escaped the grafter, they usually contrast forcibly with the others in their beautiful vigor, setting off unpleasantly the imperfect vegetation of the grafted vine. Grafts of three and four years show most of the weakness. The failing is rarely noticed in the second year after grafting, and more rarely yet in the first year. American vines, not grafted, are uniform in showing luxuriant vegetation.

ENFEEBLEMENT OF VINES.

The above named trouble has been remarked heretofore: vineyardists attributing the enfeeblement to poor grafting, bad unions, or atmospheric accidents. This year, however, as a large area of grafted vines have arrived at the age of three and four years, the fact has become more noticeable. Further, the damage has been greatly intensified by certain meteorological phenomena, which latter cause has not been generally appreciated, but which has greatly held back the vegetation in the vineyards. It is quite

possible that the quick and sudden changes in temperature, which took place in the spring, is partly responsible for this condition of the grafted vines.

This enfeeblement of grafted vines, though noticed only in isolated cases, has considerably alarmed our vine growers—so much so, that the *Riparia*, in which it is most noticable, is less favored in the market now than resistant vines suitable for direct production; *e. g.*, rooted *Riparias* were last year sold at from \$16 to \$20 per thousand, whilst Lenoir roots brought only \$12 to \$14 per thousand. This year the Lenoir roots are worth \$16 to \$20 per thousand, and *Riparias* do not find buyers at \$14. This is one of the extreme cases of exaggerated public opinion not unfrequently noticed.

Many explanations have been offered for this failing of certain grafted vines. By some it is attributed to intemperate weather and to a want of warmth in the soil. This is not satisfactory, inasmuch as these plants remaining ungrafted show no signs of suffering. Some believe it to be due to the imperfect union formed with the scion. This is improbable, as indicated by the heavy growth and luxuriant foliage of grafts on Lenoir roots—growing perhaps on the same spot, and having been grafted by the same workmen who grafted the *Riparias* now showing the defect.

CAUSE OF THE FAILURE.

Finally, it has been asserted that the evil is directly attributable to the soil, but no rule is given directing us as to what soils to choose for these grafted vines.

It cannot be disputed that the nature of the soil has a predominating effect; but even this must be considered as varying with the variety of resistant vine chosen for the root.

I am of the opinion that the sole cause of failure is the improper choice of the root for the particular soil planted—an error in the matter of adaptation. If such is the case, how may we explain the fact that the ungrafted plants are vigorous, when the grafts suffer? Why is it thus? Simply because the graft renders the root more delicate and susceptible to unfavorable conditions, which might not otherwise affect the plant. We are assisted to this conclusion by former experiences in grafting on European vines, for it was only on those grafts so conducted as to prevent the rooting of the scion, that we have found similar results.

It becomes necessary to attribute our want of success in the above mentioned grafts, to an error in the choice of the soil which naturally repels the culture of a grafted vine, or to an error in the choice of the variety adopted for that soil.

The same errors have been committed in the planting of direct producing resistants in a less degree, but, in some cases, there have been marked failures. The attention of our vineyardists becomes, therefore, at present concentrated in the choice of soil and the variety, and it is well that such is the case.

DIFFERENCE OF SOILS.

Many have drawn unwise conclusions from having visited vineyards planted to American vines reputable for their perfect growth; they have there seen direct producing resistants of superb appearance; they have found them filled with fruit, and have hastened to transport similar plants to their own soils confident of similar success, the whole resulting in failure. Thus, for instance, the proprietors owning land of an entirely different character, wanting perhaps in depth and strength, have proceeded to

plant *Riparias*, and grafted *Lenoir* vines, which they found with full vegetation in rich granitic or alluvium soils. They have failed to note the wide difference between their own soils and those accepted as examples, hence proceeds their failure. American vines are at present cultivated to such an extent that any vineyardist desirous of establishing a resistant vineyard may find in his district a soil similar to his own planted to American vines. This being the case, he may accept with perfect security the results obtained in these others' experiences.

To determine if his soil is of the same nature it is not necessary to procure a chemical analysis. He may consult the geological card and find a geological formation, accompanied by similar climatic conditions to his own. Plantations in these soils will furnish abundant examples for him. Such I believe to be the only rational method of securing success.

The study of varieties belonging to the different geological formations is not yet complete, to be sure, but when such is the case the whole problem will have been solved. One fact is certain, however, namely, that there are few formations in which the cultivation of American vines may not be advantageously employed. In nearly all cases one or more varieties will be found sure of success, and there is scarcely a place where the plantation of American vines should not be tried, even though the soil be of little depth, or possessing a subsoil impenetrable to the roots. American vines require, above all things, a soil which will permit a large development of the roots. For this reason the holes for planting should be not less than sixteen inches in depth, a proceeding indispensable to their proper planting.

FAVORED VARIETIES.

The American vines most in favor in this region at present are: for grafting, the *Lenoir*, the *Riparia*, the *Rupestris*, the *Solonis*, and the *Taylor*; for direct producers, the *Lenoir*, the *Othello*, and the *Herbemont*.

The *Riparia* has been unjustly neglected this season; but in rich, deep, alluvial soil it furnishes grafts of superior fruiting power; and, too, in varieties that do not attain the same production on any other stock. The *Rupestris*, in gravelly soils, and the *Solonis*, in new ground, have produced excellent grafts, and are receiving more attention; they now rank nearly up with the *Riparia*. The *Taylor* is one which has proved valuable only in very clayey soils, and for this reason it has been for some time quite neglected.

The *Lenoir* is the favorite of the present day, and is entitled to a high position, partly on account of its value as a direct producer, and partly for its superior value for grafting. As a direct producer it is far from comparable to European varieties. It roots with great difficulty from the cuttings; and produces, in soils of medium fertility, not more than two tons, or a little over, per acre. The wine presents serious difficulty in fermenting, and, as ordinarily prepared, furnishes, in most cases, but little body. It possesses a violet color, poorly esteemed in commerce, and is subject to frequent troublesome ferments. To make a good wine of the *Lenoir* it becomes necessary to add at least eight grammes of tartaric acid to each gallon of the juice, and to allow it to ferment on the pomace not more than two or three days. Some color and alcohol is lost by this means, but, as it ripens moderately early, the pomace will be valuable for mixing with other varieties, which will thereby become improved in both color and strength.

The *Othello* is now much in vogue, the cuttings having last year sold for \$16 per thousand, and are this year held at double this rate. It possesses

valuable qualities, in that it roots easily from the cutting and arrives at fruiting early, and produces more than the Lenoir by half at least.

The Herbemont is not agreeable to the hot, dry plains of the region. In the mountainous parts it produces a wine highly esteemed, and in production it is comparable to the Lenoir.

All direct-producing American vines here cultivated are greatly inferior in quality to the indigenous varieties, and are less prolific. There is now, therefore, great interest attached to the study of hybrids of European with American resistants. Of the numerous hybrids thus far produced in the laboratories and nurseries, there are none which yet justify planting on an extensive scale. Among direct producers already tried has been found one grown from the seed of the Lenoir; namely, the Saint Sauveur. It appears to justify the high hopes already ventured for it.

To summarize, the viticultural situation in the south is considered good. The work of reconstitution and defense in the vineyards has not ceased to progress. Planting in sand and submersion give admirable results. Treatment with sulphides is becoming each day more perfected. Plantings of American vines take each year increased possession of the soil, and will cease to present any examples of failure when the growers make judicious selection of their soils and of varieties adapted by an understanding of results obtained heretofore on the different geological formations.

A. HÉRISSON,

Inspector of Agricultural Instruction, charged with the functions of Inspector of Agriculture.

RESEARCHES ON THE ELECTRIFICATION OF WINE,

By FLAVIO MENGARINI, Rome, 1887 (translated from the Italian, by Messrs. Tojetti and Cevasco, and approved by Father Neri), being

Appendix 6 to the Annual Report of the Chief Executive Viticultural Officer
FOR THE YEAR 1887.

In February, 1885, at the Physical Institute of the University of Rome I commenced experiments on the rapid growing old of wine by means of electricity. It interested me to understand more of the chemical actions of an electric current on wine in general, already noted and announced in the works of Professor Blaserna (1), Caspeni (2), and others, the different effects that a current of constant intensity would have produced applied to the same sample of wine during different periods of time, and especially to know the different grades of oxydation, what would be the subordinate results of the conservability that the wine would have acquired.

The experiments were conducted in this way: In a small vat of the capacity of ten litres, or thereabouts, I immersed two plates of platina, sixty-six millimetres in length, twenty-five inches in width, and thirty-five millimetres apart, that communicated with a pile of six Bunsen batteries, large model, mounted in tension. I introduced in the same circuit a compass that was graded in amperes, destined to measure the current furnished.

Before commencing the experiment I preserved a part in a bottle (laboratory bottle of Erlenmeyer) closed with a cork, a sample of the liquid that was to undergo the test. It was a common white wine of the firm Ostini di Gengano, still rich with fermenting matter, and in a fair way of maturation. I caused the current to act, and measured the intensity by means of an electrometer; extracted after thirty hours a sample, which I preserved in the same manner as the other. I renewed the plates, and continued the action of the current for six hours, extracted another sample. After another six hours, a third, and so on successively, observing the current furnished and the number of hours it continued to act. Extracted fifteen other samples; the last had received the current for one hundred and thirty hours, which I preserved as the others preceding. The residue of about three and one half liters I gathered in a jar, closed with a cork, and hermetically sealed with paraffine.

I removed the plates from the wine and, when the action of the current was stopped, found them to be covered with an albuminoid substance, almost black and in an advanced state of oxydation. The wine appeared musty, and had acquired a perfume, that from the samples less electrified it appeared sensibly increasing as to become exaggerated and dissimilar to that of old wines, in the samples longer electrified.

Previous to these first observations the samples gathered as aforesaid, in bottles lightly corked, with the exception of the latter, which was sealed, were placed in a room of the Physical Institute, which was at a constant temperature of 15° Centigrade, together with the sample of wine that was not electrified, that should have demonstrated its degree of conservability

in comparison with the others that had received different quantities of the current.

After a sojourn of a year, with the conditions above described, I retook all the samples, held a microscopic examination, and then placed them under a chemical analysis, leaving the residue for an organolitic examination.

The results of the analysis and observations performed, being comparative, can better be learned from the following table. In it with the letter (A) I designate the characteristics of a sample taken from the original barrel a year before the wine to undergo the experiments was extracted. With the letter (B) the sample not exposed to the electricity, but preserved in the same condition as the others. With No. 1, I marked the first sample that had received thirty hours of current at the rate of 3.99 amperes per hour.

I must note here that the current furnished being in rate of 0.133 amperes, the coulomb of electricity received by sample No. 1, would be 14,364, but I prefer to explain, for the simplicity of the phrase, this number in ampere hours.

The second column shows the number of hours the wine was exposed to the current. The third column contains the number of ampere hours received by each wine. The fourth column shows the results of the microscopic examinations. The fifth, the results of the chemical determinations of the alcohol, total acidity, and extraction substances, showing the differences between the electrified sample and the natural wine.

The two last columns report the organolitic characteristics and special observations.

(1.) On the way of enaging wine by means of electric current, extracted from the annals of Sicilian Agriculture. No. 14, August 1, 1870.

(2.) Practical theory of enologia. Torino E. Loescher, 1882. Vol. 1. page 124.

ANALYTICAL TABLE.

No. of the Sample.	No. of Hours the Wine was subject to the current.	Quantity of the Elec- tric Current, in Am- pere-hour.	Microscopic Observations.
A	0	0	Saccharomycs of the alcoholic fermentation, the <i>ellipsoidens</i> pre- vailing, the most being dead; a few living, with but little activity.
B	0	0	Alcoholic inactive ferments, very active and intense, vegetation of <i>bacterium aceti</i> . The sediment on the bottom of the sample very rich of filamentous matter; incipient putrefaction.
1	30	3.99	Plenty of pulverulent sediment composed of <i>ellipsoidens</i> on the sur- face and in the body of the liquid; <i>bacterium aceti</i> in great quantity.
2	36	4.79	On the surface: <i>saccharomyces ellipsoidens</i> , filaments and <i>bacterium aceti</i> . On the bottom, very little <i>bacterium aceti</i> , <i>saccha- romyces ellipsoidens</i> , filaments in less quantity than on the surface.
3	42	5.58	Rich of sediment on the bottom, poor on the surface; the same fungi as the preceding, but less vegetation of filaments.
4	48	6.38	Like the preceding; on the bottom, inactive <i>saccharomyces mycoderma</i> entirely wrapped in a bacteriaceous form; very small and granular.
5	54	7.18	 <i>Saccharomyces ellipsoidens</i> and very <i>mycoderma</i> ; <i>bacterium aceti</i> ; on the bottom, granular form like the preceding.
6	60	7.98	Floating fatty substance; <i>saccharomyces ellipsoidens</i> ; the <i>mycoderma</i> in more propor- tion than in the other samples; granular form and <i>bacterium aceti</i> .
7	66	8.78	The granular substance wrapping on the surface and on the bottom the <i>saccharomyces mycoderma</i> and the <i>ellipsoi- dens</i> ; not much <i>bacterium aceti</i> , in proportion of the other samples.
8	73	9.71	Like the preceding; presence of <i>bacillum</i> on the bottom.
9	79	10.51	Like the preceding; the <i>sac. mycoderma</i> <i>vini</i> . increases on the <i>sac. ellipsoidens</i> , and the acidity diminishes.
10	85	11.30	Like the preceding.
11	92	12.24	On the surface, <i>saccharomyces mycoderma</i> , in large quantity; on the bottom, not much <i>bacterium aceti</i> and granulation.
12	98	13.04	Like the preceding, circular forms, very likely of <i>saccharomyces ellipsoidens</i> decomposing.
13	104	13.83	On the bottom, granulation in large quantity; on the surface a good deal of <i>saccharomyces mycoderma</i> ; the <i>bacterium aceti</i> scarce.
14	111	14.76	Like the preceding, circular forms; no <i>bacterium aceti</i> .
15	118	15.89	A good deal of sediment, like the preceding.
16	124	16.49	On the surface, only the <i>saccharomyces mycoderma</i> ; abundant granulation; no <i>bacterium aceti</i> .
17	130	17.29	On the bottom, large and narrow stripes of organic substance, not organized, and consequently not being fungi matter; no <i>bacterium aceti</i> ; on the surface a few <i>saccharomyces mycoderma</i> .
18	130	17.29	Many alcoholic <i>saccharomyces</i> ; very few <i>saccharomyces mycoderma</i> ; granulation; no <i>bacterium aceti</i> .

CHEMICAL ANALYSIS.				ORGANOLEPTIC ANALYSIS.	OBSERVATIONS.
Alcohol, per cent	Total Acidity, per cent (less the CO ₂)	Acetic Acid, per cent	Extractive Substances, per cent		
10.3	6.9	-----	25.30	When not much decolorized, very young, still in low fermentation, without any conspicuous perfume.	Analysed at the moment of the experiment, not electrified. Wine type of comparison taken from the original barrel.
10.3	6.9	-----	25.30	The wine has passed entirely through the acetic fermentation, and begins to putrify.	Sample of comparison not electrified, maintained in the same conditions of time and temperature as the electrified samples.
6.7	13.17	6.27	16.3	Limpid and perfumed; acetified.	It presents an abundant sediment on the bottom and on the neck of the bottle.
6.50	20.1	13.2	16.8	More colored than the preceding; a little bitter, besides the acidity.	Like the preceding.
5.45	19.9	13.0	16.1	Decolored and perfumed, still much acetified.	Like the preceding.
4.95	22.7	15.8	23.7	Faded, sharply acetified, free taste, very decolored.	The bottom compact, gelatinous, adhering to the glass.
4.57	10.7	3.8	16.4	Incomplete acetification, perfumed very limpid, and decolored.	Abundant and compact sediment.
4.40	22.50	15.6	14.7	Sharply acetified, not much decolored.	Abundant and compact sediment.
4.29	17.00	10.7	14.8	More colored and less limpid than No. 4; acetified, coarse, and complex taste.	Abundant and compact sediment.
4.30	17.55	10.05	14.9	Acetified and weak.	Abundant and compact sediment.
4.25	10.10	3.20	14.6	Very decolored in comparison with the preceding.	Abundant and compact sediment.
4.25	9.3	2.4	14.0	More decolored than the preceding, faded, lightly acetified, bitterish.	Abundant and compact sediment.
6.5	8.25	1.35	15.9	Faded, decolored, the acidity not much perceptible.	Abundant and compact sediment.
3.9	7.2	0.3	16.0	Not much decolored, much faded, no acidity, bitterish.	Abundant and compact sediment.
4.0	7.15	0.25	16.9	Very decolored and perfumed.	Abundant and compact sediment.
3.5	7.00	0.1	17.7	Very decolored and perfumed.	Abundant and compact sediment.
3.75	7.10	0.2	18.1	Very decolored and perfumed.	Abundant and compact sediment.
3.10	6.85	*0.05	16.5	Good, perfectly sound, no sign of acetification.	Abundant and compact sediment.
8.65	6.54	0.30	16.5	Good, perfectly sound, no sign of acetification.	Bottle with emery-polished stopper.
8.9	6.17	0.73	16.4	Very good, limpid, and greatly decolored, better than the sample type.	Residue of the experiment: volume like 3.50 in bottle closed with a cork and paraffine.

* Total loss of acidity on the wine type.

It remaining now to try the conclusions, both from the analytical table and from the general proceedings of the experiments, summing up the different phases.

The electric current introduced in the wine produces in it a rapid turbidness, followed by the precipitation on the bottom of the vessel, of all the organic substances that it has in suspension, and of a portion of the albuminoid substance naturally contained in the wine. A very small part of this sediment coats the two plates of platinum, and being there in contact with the oxygen that is developed by the current, is darkened and entirely burned, adhering to the plates in such a manner as to prevent any further precipitation. The more or less duration of the current seems not to have any influence on the quantity of the extractive substance which is precipitated, since the results of the analysis show a perceptible constant loss in all the samples, with the exception of Number 4, which has only lost 1.6 per thousand. It is not surprising if the diminution of the extract is generally so considerable, because we must take into consideration the small quantity of wine subject to the electrization in comparison with the energy of the current received by it, and the size of the plates of platinum used. Besides the wine still very young has a very high degree of density, because of the azotic substances and the organism that it contained in suspension; the rapid precipitation of these substances immediately after the action of the electric current, and their presence instead in the sample not electrified, which was separately analyzed, has produced the marked difference in the results of the analysis.

Evidently, repeating the experiment on a larger quantity of wine which has been already a little reduced, even using platinum plates of the dimension suggested by Professor Blaserna as more adapted for the electrification of large quantities—that is of six and eight centimeters in width, by thirty or forty in length, the loss of dry extract must be very small, and at any rate such as not to exceed in a perceptible manner that which takes place during the natural aging of the wine.

The results obtained on the coloring matter have not been sufficiently precise as to permit to draw a conclusion. In the most of samples there was some weakness of color, and it would seem that it even increases with the increasing of the electric action; then there was not only interruption in this gradual decoloration, but in the samples 4, 5, 6, and 7, the coloring intensity increased in comparison with numbers 2 and 3, which were fairly decolorated, so that the sample 8 became nearly uncolored, and approaching the yellow color of a very old wine.

There is no doubt, as it has been well demonstrated, that the precipitation of color takes place under the action of the current, but new experiments are needed, especially on red wines, to determine with better precision how and in what proportion it takes place; which causes can thwart it, and to what limits it can be brought; because it could happen that to obtain a rapid aging, it would become necessary to use such a quantity of current as to deteriorate the coloring matter, or to cause a too large precipitation that would damage the wine, by depriving it of one of its qualities most appreciated by the trade.

The difference in the alcoholic degree between the wine type and the first sample, which is the less electrified, is of about 3.6 per hundred, and increases with regular progression in such a manner that in the sixteenth sample it reaches the double of the first difference, that is, 7.2 per hundred.

It seems evident that these two losses are due, the first to the formation of the acetic acid and to the fading of the alcohol during the period of one year, because of the samples remaining in contact with the air being lightly

corked; the ground to the production of *saccharomyces microderma vini*, and for a small portion to the evaporation of the alcohol being carried away by the little bubbles of gas developed by the electrolysis of the air. This latter loss increases with the increasing of the current in a sufficiently regular manner, and comparing the results of the analysis, we find that it has an average value of about 15 hundredths per cent for every six hours of current.

From this amount may be deducted approximately what represents the loss of alcohol by elimination during the electrolysis. The sample number 18, which being more electrified than all others, of larger volume and hermetically closed, has remained free from acidity and slow evaporation, has given to the analysis 8.9 per cent of alcohol, that is a total diminution of 1.4 per cent on the sample type; this diminution, supposing it has taken place during the electric action, would correspond to about 0.07 for each six hours of current, and then the loss due only to the *saccharomyces mycoderma* should be of 8 hundredths per cent, without taking into consideration the difference occasioned by the gradual diminution of the acetic acid.

These results have a quite theoretical value: because, if the current is applied to large quantities, preserved with care, the loss of alcohol would be very small, and commercially of no importance.

More important is the formation of the acetic acid in relation to the duration of the electrification, because it affords a new criterion on the antiseptic power exercised by an electric current on the wine, and also, generally, on any fermented or fermenting matter.

In order to determine this action as carefully as possible, a wine was selected in the best condition to produce secondary alterations and fermentations, that is, a wine still rich of ferments and of azotic matters. In fact, the sample which was not electrified was soon changed into vinegar, and afterwards all the mass becoming putrefied.

On the contrary, there was no putrefaction in the electrified samples, notwithstanding the albugineous precipitation, which has produced a commencement of decomposition not accompanied by any formation of ammonia, ether, etc., as generally is the case. The very small granular form perceptible in the sample No. 4, probably is only the product of this maceration, rather than decomposition, through which has passed the azotic substance by remaining, during one year, in contact with the wine. This opinion agrees with that of Professor Pirota, of the Botanical Institute of Rome, and is applied also to the circular forms observed in the sample of No. 12 and others.

The formation of the acetic acid stands in inverse ratio of the duration of the current, whilst the production of the *saccharomyces mycoderma* takes place in direct ratio. This can be attributed to the difficulty met by the two ferments in order to develop themselves at the same time, and to the superficial vegetation of the *saccharomyces mycoderma*, which its biological condition is less affected by the antiseptic diffused in the surrounding air. On the contrary, in the mass of the liquid all the alcoholic ferments are precipitated as soon as they become inactive, and the *bacterium aceti*, which alone is found living, must submit by degrees to the *saccharomyces mycoderma vini*, because of being directly exposed to the action of electricity.

In the sample No. 14, which has received one hundred and eleven hours, 14.76 ampere-hour, and in the following, there is not in the microscopic observation any *bacterium aceti*, although in the result of the chemical analysis there is, in Nos. 14 and 15, a light exuberance of acidity on that of the wine type, which may be considered as acetic acid. To still

better determine until what limits these latter samples would remain free from acidity and other diseases, I left the Nos. 14, 15, and 16 at the open air, without closing them, during all the summer and fall. After this time I examined them with the microscope, and found them turbid from dust, ferments, etc.; but none of them in a state of putrefaction, and only one, the No. 14, beginning to become acid.

The importance of these results ought not to pass unheeded, obtained, as they were, by simple and harmless means; and it is not improbable that they may find some useful application, even outside of the analogical field. If, in so unfavorable conditions, it was possible to make sterile the wine to such an extent, it is but natural to believe that by applying the electricity to large quantities, a sterility of the wine, nearly absolute, could be obtained. But it is necessary to make experiments on a larger scale, in order to learn approximately what quantity of current is required to make sterile certain known quantities of wine, with due proportion to the precipitation of the coloring matter, and to the perfume that is formed. For the present we may hold that a moderate application of current develops an aroma suitable to the wine; but if it is lengthened too much it produces a too pronounced scent, in which is also perceptible that of ozone, by which its value is determined, while the wine acquires preservative qualities that increase in direct ratio of the duration of the electrification.

The principle which has prevailed until now, that the electric current applied to the wine imparts to it the character it acquires by aging is, in conclusion, a little displaced. We must take into consideration an anti-septic action of great energy, which, perhaps, can be more useful to the wine than the rapid aging which is produced from the same cause. It remains to study in what manner and measure these effects are compatible one to the other, both in the scientific and the analogical and industrial interest.

HERBACEOUS GRAFTING.*

PRELIMINARY INSTRUCTIONS FOR EXPERIMENTAL WORK,

Issued by the Chief Executive Viticultural Officer to the Inspectors of the Viticultural Commission, June, 1887.

Herbaceous grafting, as applied to the vine, consists in grafting on the growing wood in midsummer. It is a method which has been known for fifty years past in Central and Eastern Europe, and has recently become common in the region of Hungary. So valuable has the method here described been found, that during the past year, Von Hermann Goethe, Director of the Royal School of Viticulture at Marburg, has issued a work largely devoted to the subject. Other and more common systems are treated by Professor Goethe, but preference is given to the above named method in that it has opened a new and short way to the establishment of resistant vineyards as well as affording improved facilities for changing objectionable varieties to others of better quality.

The many novel methods of grafting the vine which have been proposed of late years, and their common failure in practice, have led me to believe that such announcements as that of our esteemed contemporary, Hermann Goethe, must undergo a certain practical test in the vineyards of this State before being generally accepted as fully adapted to our climate.

Before, therefore, proceeding to announce to our vine growers the value of herbaceous grafting, I have thought proper to ask our inspectors and others working with us, to this year make a test of the method described in the following—so far, at least, as the lateness of the season may permit—and transmit to this Board the results of their experiments, that another season may find us able to adopt or discard the system altogether.

The many advantages obtained from its use, if successful, will become evident to our vine growers as they proceed: advantages which, if the method prove successful in California, our vineyardists cannot afford to be long without.

Believing that the method must depend to a large extent on the care and accuracy with which such delicate work is executed, I have illustrated fully the operation in Figures I, II, and III: these, if followed closely with a careful study of the following text, will, according to our friend Hermann Goethe, lead to success.

The period chosen for performing the operations is of the greatest importance. The most propitious epoch found in Hungary ends about the middle of July. As our vines put forth earlier and are now further advanced, it may be plainly seen that there is no time to lose. The information here reproduced came to me so late that instructions could not be issued sooner. In consideration of this fact it is to be hoped that the experiments will be performed immediately and that our experimenters may be particularly careful to use only delicate and rapidly growing shoots for both scion and subject. (The term "subject" is applied to the cane into which the scion is inserted.)

* For results of these instructions, see report of Chief Executive Officer.

Experiments in this work have already been begun by me with fair indications of success, but it is still too early to judge their value.

TO OPERATE,

Choose that period in the growth of the vine when the shoots show daily advancement, selecting the most vigorous canes for the purpose. The union should be made at a point on the green shoot, so near to the growing end as to exhibit no white pith when cut. In fact, that part of the cane in which the pith is scarcely distinguishable from the wood and bark is the surest to unite with the scion. It must, however, be strong enough when wound to maintain the scion well in position.

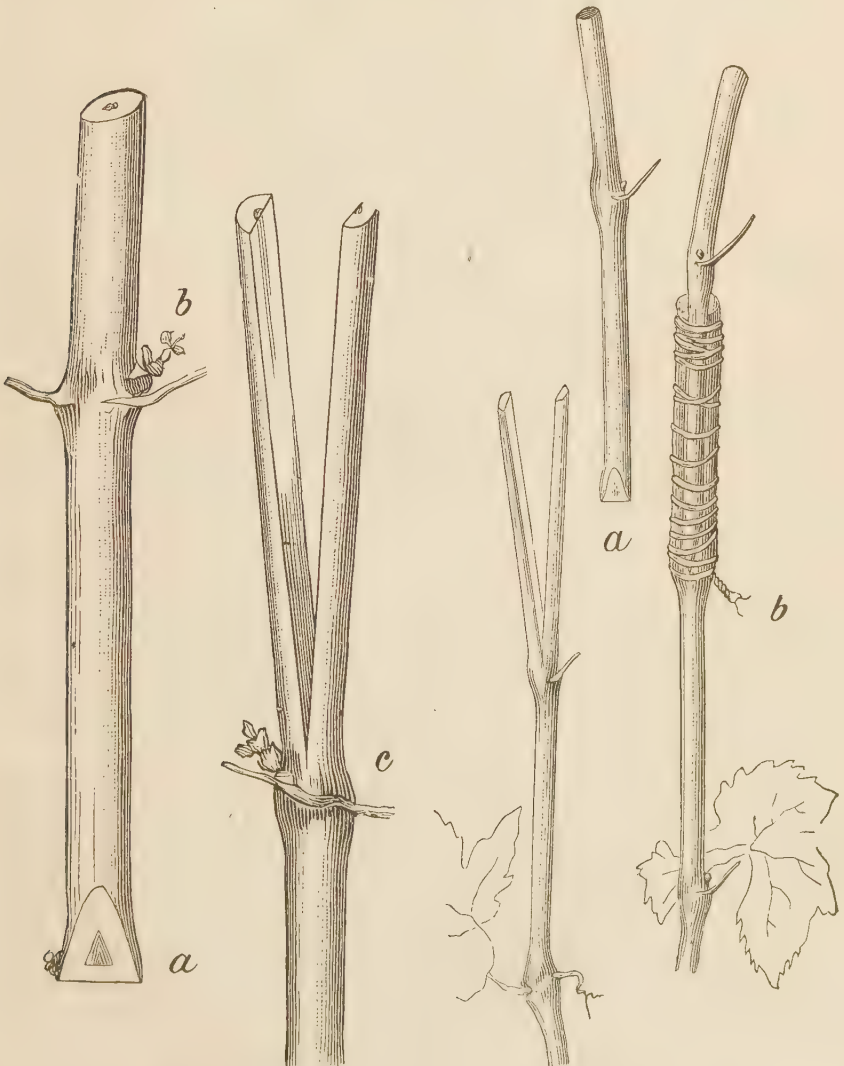


Figure I.

Figure II.

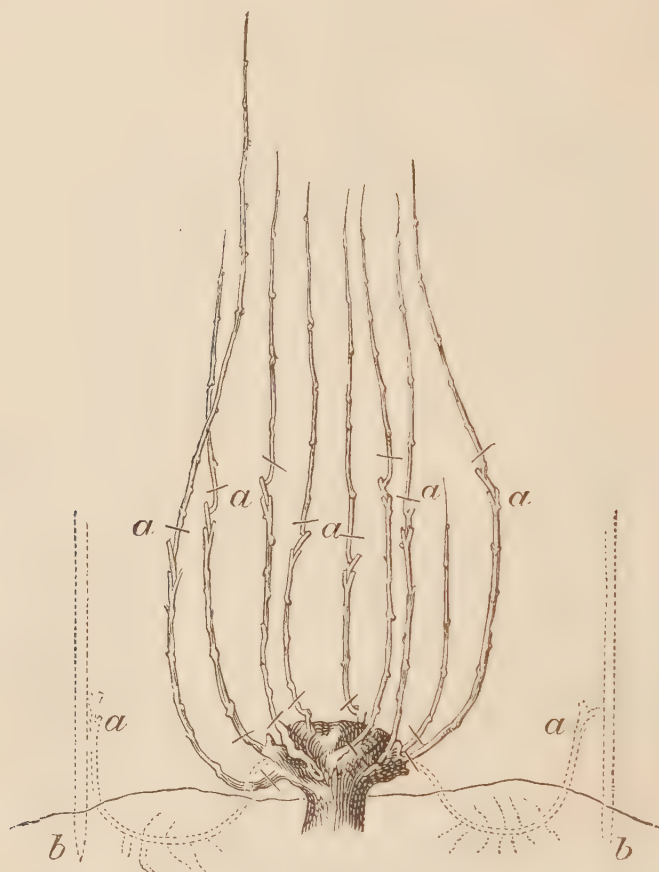


Figure III.

Figure II exhibits the graft when complete—natural size. Figure I shows the parts enlarged. The last of June has been generally selected for the work, although some work performed the first of July has shown a loss of only two per cent. When late spring frosts prevail a later period is chosen, as the rapid growth then comes later. This graft cannot be made to succeed on canes attaining a woody appearance, but both scion and subject must be elastic and yet not too soft.

The bud on the scion at *b*, Figure I, must be examined and found good, and in selecting the scion it is generally safe to choose that bud at the base of the first well-opened leaf found on the growing cane. Lower and more woody scions will not answer. Laterals which show slow growth will not answer for the subject, but may be selected if still growing vigorously. The original canes proceeding direct from old spurs are most commonly selected for the subjects, particularly those which show a bright sappy appearance.

Warm growing weather favors much herbaceous grafting. A cold wind is harmful in checking growth, likewise a dry hot wind, and it is well, in hot weather, to suspend operations during a few hours in the middle of the day.

Do not graft vines showing a sickly appearance.

The preparation of the scion is clearly shown in the cuts, only be careful to preserve the scions fresh. If necessary to keep them some time, place them in water, thoroughly shaking off the water at time of grafting. Let the cut of the lower end of the scion (*a*, Figure I) be made through the bud that the point of the wedge may possess the enlargement necessary to fit the base of the cut in the subject as shown at *c*. The knife in entering the subject should split it just through the middle and descend half way through the center of the enlarged part *c*, Figure I. Let the size of the scion be near that of the subject, never larger. The leaf joining the bud of the scion at *b*, Figure I, should be cut off, leaving the stem as shown in the cut.

In inserting the scion see that the bark of the two parts come smoothly together at the point and that the tender bark is not broken or slipped. A safe precaution is to spread apart the subject when pushing home the scion.

To tie the graft, use a cotton string; begin to wind at the top and, by drawing it close and tight at the bottom near the bud, you will prevent the scions being forced from place.

This done, six or eight days will determine the measure of your success. By this time the scion bud should have begun to grow, following which all suckers and laterals drawing from the cane on which the graft is placed should be carefully removed, and this latter operation repeated as often as may be required to force all growth to the new part.

The success of the graft is early indicated by the falling off of the leaf stem which was allowed to remain on the scion. As the union grows the string must be loosened. The short time necessary to determine the success of this method gives ample opportunity to repeat the operation several times during the season, if success does not attend the first efforts.

Grafts made on growing canes of riparia vines two years old have shown good results, though older vines are equally good. Figure III shows an old riparia vine grafted on its growing parts at *a*, thus producing resistant grafted cuttings well united above to a better variety, which may be planted in the new vineyard the following spring or layered and rooted as shown by the dotted line.

Many other advantages growing out of this method will be explained later if we can determine the success promised by Professor Goethe. In the meantime we call upon you to experiment carefully and forward your results as early as possible.

Very respectfully,

JOHN H. WHEELER.
Chief Executive Viticultural Officer.

REPORT
OF THE
STATE ANALYST
FOR 1887.

REPORT OF THE STATE ANALYST FOR 1887.

OFFICE OF STATE ANALYST, }
BERKELEY, CAL., April 1, 1888. }

To the State Board of Viticultural Commissioners :

GENTLEMEN: During the year ending April 1, 1888, there were sent to the office one hundred and seventy-eight samples to be tested for adulterations. They may be classified as follows:

Wines.....	149
Wines (for arsenic only).....	4
Grapes (for arsenic only).....	4
Wines (for zinc only).....	2
Grapes (for zinc only).....	2
Tannin (for boracic acid only).....	1
Cream of tartar (for boracic acid only).....	1
Sal soda (for boracic acid only).....	1
Wine preservatives.....	4
Clarifiers, etc.	10
Total.....	178

In none of the one hundred and forty-nine samples of wine were found any excess of sulphate of potash over two grains per litre (the maximum allowed by the French Government), which shows that the plastering, where practiced, has not been excessive; and in none were found any salicylic acid, excess of sulphites, or artificial coloring matters. In two were found considerable quantities of boracic acid, which had evidently been added with a view to preserve the wine.

Out of eighty-five samples, which were tested with a view to discover minute traces of this acid, thirty-four were found to contain traces of it. Finding so many samples containing traces of boracic acid (which has never heretofore been cited as a natural constituent of pure wine), we were led to suspect that in California it was a natural constituent of some wines, at least. With a view to confirming or proving the foundation for this suspicion, we began to look more carefully for traces of boracic acid. As a result, out of twenty-two consecutive samples of wine, some of which were positively known to be pure, every one, without exception, were found to contain traces of the acid. And in another series of twenty-one consecutive samples, which were examined for traces of boracic acid by an entirely different method, not one failed to give a distinct test for that substance. Since some of these wines were *known to be pure*, and gave distinct reactions by *both* methods, the conclusions seem almost inevitable, that some at least of our pure California wines contain, as a natural constituent, traces of boracic acid.

The samples of grapes tested for arsenic and zinc were from vines that had been treated, last June, with the following solutions:

- A.—1 ounce Paris green to 1 gallon water.
- B.—1 ounce Paris green to 2 gallons water.
- C.—1 ounce arsenic to 5 gallons water.
- D.—1 ounce arsenic to 10 gallons water.
- E.—1 ounce acetate of zinc to 2 gallons water.
- F.—1 ounce acetate of zinc to 4 gallons water.

Arsenic was found in each of the first four samples: the greatest amount being found in "D," in which was found .00005 grammes of metallic arsenic in 382 grammes of the grapes. The others contained even considerably less than this. No zinc was found in either "E" or "F." The wines tested for the same toxicants were made from the grapes of which the above were samples. Neither arsenic nor zinc were found in any of these.

Of the wine preservatives examined, two of them would have introduced sulphurous acid into the wine (both being bisulphites), and the other two contained large quantities of boracic acid. Of the "clarifiers" examined, none were considered harmful.

It is almost impossible, at present, to assert the presence of an excess of glycerine (unless extreme), owing to the fact that there has not been, as yet, any reliable standard established for California wines: and, until such a standard is established, it will be impossible to say just what amount shall constitute an "excess." There has been found such a difference between the normal quantity of glycerine existing in German wines and that found to exist in the wines of France, that it would be hazardous to infer the normal quantity of that substance existing in pure California wines, from either of those two standards. The same may be said in regard to the detection of "watered" wines, where the "watering" has been done in a scientific manner.

The establishment of such a standard as we require for our work, implies the analyses of several thousand samples, extending over several years. More assistance than is at present given the office, is required to accomplish this work in anything short of a number of years of patient, tedious work, which will be in every sense a mere and necessary preliminary to the better work, and surer detection of adulterations, which the office hopes in the future to accomplish. Fortunately, the extent to which adulteration of wine has been carried here, is so small, that we may hope that this work of establishing a standard will more than keep apace with the progress of the practice of sophistication. In conclusion, we may state that this work is first in importance as regards the certain detection of adulteration, and shall consequently occupy all the spare time of the office until accomplished. And it is of the utmost importance to honorable wine dealers, of particular moment to the wine producers, and of no small interest, both from a hygienic and financial standpoint to the State, that this work be pushed forward with all due haste.

The following is a detailed statement of the work done during the year, in a condensed form:

No.	Excess of K_2SO_4 Over 2 gms. per Litre.	Salicylic Acid.	Sulphites, (excess).	Boracic Acid.	Artificial Coloring Matters.	REMARKS.
60	-----	Absent.	-----	Absent.	-----	Extract (taken on 10 ^{cc} , dried at 100° to a constant weight)=7.962 gms. per 100 ^{cc} . Ash, per 100 ^{cc} = .220 gms. Sulphates (as SO_3), per 100 ^{cc} = .100 gms.
61	-----	Absent.	-----	Absent.	-----	Glycerine, per 100 ^{cc} = .960 gms. Sulphates (as SO_3), per 100 ^{cc} = .0369 gms.
62	-----	Absent.	-----	Trace.	-----	Glycerine, per 100 ^{cc} = 1.130 gms. Sulphates (as SO_3), per 100 ^{cc} = .0404 gms.
63	-----	-----	-----	-----	-----	Glycerine, per 100 ^{cc} = .838 gms. Marked "Crystalline Wine Preservative." Found to be bisulphite of potash.
64	-----	-----	-----	-----	-----	Tannin, per 100 ^{cc} = .0092 gms.

No.	Excess of K_2SO_4 Over 2 gms. per Litre.	Salicylic Acid.	Sulphites, (excess).	Boracic Acid.	Artificial Coloring Matters.	REMARKS.
65	None.	Absent.	None.	Absent.	Absent.	
66	None.	Absent.	None.	Trace.	Absent.	
67	None.	Absent.	None.	Absent.		
68	None.	Absent.	None.	Absent.		
69	None.	Absent.	None.	Absent.	Absent.	
70	None.	Absent.	None.	Trace.	Absent.	
71	None.	Absent.	None.	Trace.	Absent.	
72	None.	Absent.	None.	Trace.		
73	None.	Absent.	None.	Trace.		
74	None.	Absent.	None.	Trace.		
75	None.	Absent.	None.	Trace.		
76	None.	Absent.	None.	Trace.		
77	None.	Absent.	None.	Trace.	Absent.	
78	None.	Absent.	None.	Trace.	Absent.	
79	None.	Absent.	None.	Trace.		
80	None.	Absent.	None.			
81	None.	Absent.	None.	Absent.	Absent.	
82	None.	Absent.	None.	Absent.	Absent.	
83	None.	Absent.	None.	Absent.		
84	None.	Absent.	None.	Trace.		
85	None.	Absent.	None.	Trace.		
86						(Bottle broken when received.)
87	None.	Absent.	None.	Trace.	Absent.	
88	None.	Absent.	None.	Trace.	Absent.	
89	None.	Absent.	None.	Trace.		
90	None.	Absent.	None.	Trace.		
91	None.	Absent.	None.	Trace.	Absent.	
92	None.	Absent.	None.	Absent.		
93	None.	Absent.	None.	Absent.		
94	None.	Absent.	None.	Absent.	Absent.	
95	None.	Absent.	None.	Absent.	Absent.	
96	None.	Absent.	None.	Absent.		
97	None.	Absent.	None.	Absent.		
98	None.	Absent.	None.	Absent.		
99	None.	Absent.	None.	Absent.	Absent.	
100	None.	Absent.	None.	Absent.	Absent.	
101	None.	Absent.	None.	Absent.	Absent.	
102	None.	Absent.	None.	Absent.	Absent.	
103	None.	Absent.	None.	Absent.	Absent.	
104	None.	Absent.	None.	Absent.	Absent.	
105	None.	Absent.	None.	Present.	Absent.	
106	None.	Absent.	None.	Present.	Absent.	
107	None.	Absent.	None.	Absent.	Absent.	
108	None.	Absent.	None.	Absent.	Absent.	
109	None.	Absent.	None.	Absent.	Absent.	
110	None.	Absent.	None.	Absent.		
111	None.	Absent.	None.	Absent.	Absent.	
112	None.	Absent.	None.	Absent.	Absent.	
113	None.	Absent.	None.	Absent.	Absent.	
114	None.	Absent.	None.	Absent.	Absent.	
115	None.	Absent.	None.	Trace.	Absent.	
116	None.	Absent.	None.	Trace.	Absent.	
117	None.	Absent.	None.	Trace.		
118	None.	Absent.	None.	Trace.		
119	None.	Absent.	None.	Trace.		
120	None.	Absent.	None.	Trace.		
121	None.	Absent.	None.	Trace.	Absent.	

No.	Excess of K_2SO_4 Over 2 gms. per Litre.	Salicylic Acid.	Sulphites, (excess).	Boracic Acid.	Artificial Coloring Matters.	REMARKS.
124	None.	Absent.	None.	Absent.	-----	
125	None.	Absent.	None.	Absent.	-----	
126	-----	Absent.	None.	Absent.	Absent.	Extract (dried at 100° for 3½ hours) 5.262 gms. Specific gravity (21° C.), 1.1003. Alcohol (absolute alcohol by weight), 10.74 per cent. Sulphates (as K_2SO_4), .05396 gms. Glycerine, .749 gms. Total acidity (as H_2SO_4), .6336 gms. Volatile acidity (as H_2SO_4), 2.588 gms. Sugar (as levulose), 1.09 gms. Ash soluble, .3235 gms. Insoluble, .0713 gms. [Weights given are per 100 ^{cc} of wine.]
127	None.	Absent.	None.	Absent.	Absent.	
128	None.	Absent.	None.	Absent.	Absent.	
129	None.	Absent.	None.	Absent.	-----	
130	None.	Absent.	None.	Absent.	-----	
131	None.	Absent.	None.	Trace.	-----	
132	-----	-----	-----	-----	-----	
133	None.	Absent.	None.	Trace.	Absent.	
134	None.	Absent.	None.	Absent.	Absent.	
135	None.	Absent.	None.	Absent.	Absent.	
136	None.	Absent.	None.	Absent.	-----	
137	None.	Absent.	None.	Absent.	-----	
138	None.	Absent.	None.	Trace.	-----	
139	None.	Absent.	None.	Trace.	Absent.	
140	None.	Absent.	None.	Absent.	Absent.	
141	None.	Absent.	None.	Absent.	Absent.	
142	None.	Absent.	None.	Trace.	-----	
143	None.	Absent.	None.	Trace.	-----	
144	None.	Absent.	None.	Trace.	-----	
145	None.	Absent.	None.	Absent.	-----	
146	None.	Absent.	None.	Absent.	-----	
147	None.	Absent.	None.	Absent.	-----	
148	None.	Absent.	None.	Trace.	-----	
149	None.	Absent.	None.	Absent.	-----	
150	None.	Absent.	None.	Absent.	-----	
151	-----	-----	-----	Absent.	-----	A sample of sal soda.
152	None.	Absent.	None.	Trace*	-----	*Up to this point samples were
153	None.	Absent.	None.	Trace.	-----	not examined for minute traces
154	None.	Absent.	None.	Trace.	-----	of boracic acid; but Nos. 152 to
155	None.	Absent.	None.	Trace.	-----	177 inclusive, were (by flame test).
156	None.	Absent.	None.	Trace.	-----	Also samples from No. 185 on
157	None.	Absent.	None.	Trace.	-----	were tested for traces (by tu-
					-----	meric paper test).
158	None.	Absent.	None.	Trace.	-----	Find traces of boracic acid by
159	None.	Absent.	None.	Trace.	-----	both flame and tumeric paper
					-----	tests.
160	-----	-----	-----	-----	-----	(Bottle broken when received.)
161	None.	Absent.	None.	Trace.	-----	
162	None.	Absent.	None.	Trace.	-----	
163	None.	Absent.	None.	Trace.	Absent.	
164	-----	-----	-----	-----	-----	(Bottle broken when received.)
165	-----	-----	-----	Absent.	-----	Sample of oenotannin.
166	-----	-----	-----	Absent.	-----	Sample of cream of tartar.
167	None.	Absent.	None.	Trace.	-----	
168	None.	Absent.	None.	Trace.	-----	

No.	Excess of K ₂ SO ₄ Over 2 gms. per Litre.	Salicylic Acid.	Sulphites, (excess).	Boracic Acid.	Artificial Coloring Matters.	REMARKS.
169	None.	Absent.	None.	Trace.	-----	
170	None.	Absent.	None.	Trace.	-----	
171	None.	Absent.	None.	Trace.	Absent.	
172	None.	Absent.	None.	Trace.	Absent.	
173	None.	Absent.	None.	Trace.	Absent.	
174	None.	Absent.	None.	Trace.	Absent.	Find traces of boracic acid by both flame and tumeric paper tests.
175	None.	Absent.	None.	Trace.	Absent.	
176	None.	Absent.	None.	Trace.	Absent.	
177	None.	Absent.	None.	Trace.	Absent.	Find trace of boracic acid also by tumeric paper tests.
178	-----	Absent.	None.	Absent.	-----	Marked "Wine Finings." Reaction neutral; alum absent.
179	None.	Absent.	None.	Absent.	-----	
180	None.	Absent.	None.	Trace.	-----	
181	None.	Absent.	None.	Absent.	Absent.	
182	None.	Absent.	None.	Absent.	-----	
183	None.	Absent.	None.	Absent.	Absent.	
184	None.	Absent.	None.	Absent.	Absent.	
185	None.	Absent.	None.	Absent.	Absent.	
186	None.	Absent.	None.	Trace.	Absent.	
187	None.	Absent.	None.	Trace.	-----	
188	None.	Absent.	None.	Trace.	-----	
189	None.	Absent.	None.	Trace.	-----	
190	None.	Absent.	None.	Trace.	Absent.	
191	None.	Absent.	None.	Trace.	Absent.	
192						Wines made from grapes taken from vines that had been treated in June by the following solutions:
a	-----	-----	-----	-----	-----	(a) 1 oz. Paris green to 1 gal. water.
b	-----	-----	-----	-----	-----	(b) 1 oz. Paris green to 2 gals. water.
c	-----	-----	-----	-----	-----	(c) 1 oz. arsenic to 5 gals. water.
d	-----	-----	-----	-----	-----	(d) 1 oz. arsenic to 10 gals. water.
e	-----	-----	-----	-----	-----	(e) 1 oz. acetate of zinc to 2 gals. water.
f	-----	-----	-----	-----	-----	(f) 1 oz. acetate of zinc to 4 gals. water.
						But found in a, b, c, and d no trace of arsenic; and found in e and f no trace of zinc.
193						
194						
195						
196						
197						
198						
199	None.	Absent.	None.	Trace.	-----	
200	-----	-----	-----	-----	-----	Alcohol=12.15 per cent by weight.
201	-----	-----	-----	-----	-----	Alcohol=12.8 per cent by weight.
202	-----	-----	-----	-----	-----	Alcohol=15.6 per cent by volume.
203	None.	Absent.	None.	Trace.	Absent.	
204	None.	Absent.	None.	Trace.	Absent.	
205	None.	Absent.	None.	Trace.	Absent.	
206	None.	Absent.	None.	Trace.	-----	
207	-----	-----	-----	-----	-----	Alcohol=8.1 per cent by weight.
208	None.	Absent.	None.	Trace.	-----	Alcohol=10.05 per cent by volume.
209	None.	Absent.	None.	Trace.	-----	
210	None.	Absent.	None.	Trace.	-----	
211	None.	Absent.	None.	Trace.	-----	
212	None.	Absent.	None.	Trace.	-----	
213	None.	Absent.	None.	Trace.	-----	
214	-----	-----	-----	Trace.	-----	Same as No. 158, but second vintage. Trace of boracic acid found by both tests.
215						
216	None.	Absent.	None.	Trace.	-----	
217	None.	Absent.	None.	Trace.	Absent.	

Samples marked A, B, C, D, E, and F were samples of grapes taken from wines that were treated last June with the following solutions:

A.—1 ounce of Paris green to 1 gallon of water.

B.—1 ounce of Paris green to 2 gallons of water.

C.—1 ounce of arsenic to 5 gallons of water.

D.—1 ounce of arsenic to 10 gallons of water.

E.—1 ounce of acetate of zinc to 2 gallons of water.

F.—1 ounce of acetate of zinc to 4 gallons of water.

[Samples No. 192 were wines made from grapes of which the above are samples.]

Mark.	Amount Taken—Grams.	Found by Marsh's Test.	REMARKS.
A	285	A faint mirror of arsenic.	According to Johnson and Chittenden, a "distinct" mirror indicates about .000007 grams of metallic arsenic, while a "faint" mirror indicates but .0000007 grams of the element.
B	332	A faint mirror of arsenic, even fainter than obtained for A.	
C	377	Arsenic, but less than in D.	
D	382	Good metallic mirror of arsenic; found arsenic to weigh about .00005 grams.	
E	280	No zinc.	
F	253	No zinc.	

THE ARSENIC REMEDY FOR GRASSHOPPERS.

[Report to State Board of Viticultural Commissioners, by W. B. RISING, State Analyst.]

During the summer of 1885 the grasshoppers had made such ravages upon the vines and fruit trees in many parts of the State that the vineyardists and fruit growers were obliged to resort to what seemed almost desperate remedies to save their crops. I refer to the rather liberal use of arsenic, mixed with bran, middlings, and syrup, made into a stiff paste and then set before the advancing army of grasshoppers. The remedy proved effectual, and the destroying pests were checked and the crops saved. The question was now raised, whether the fruit from vineyards and orchards where this remedy had been used was not poisoned, or at least might not contain enough of the poison to make its use injurious.

At this crisis I was called upon, as State Analyst, by your Board, to visit the districts where the arsenic had been used, and to report if in my opinion any danger was to be feared from the use of grapes and fruits from those vineyards. I immediately entered upon this investigation, going to the vineyards where the arsenic had been used, observing carefully the manner of its application and subsequent treatment. I also studied carefully the habits of the grasshopper, and its behavior both before and after eating the arsenic. I gathered a large amount of material for subsequent chemical examination. I ought to add that I was everywhere received most cordially, and every assistance possible rendered me in the pursuit of my investigation. I also received much valuable information in regard to the habits of the grasshopper from the very intelligent and observing vineyardists.

Two methods of investigation seemed open to me: one experimental, *i. e.*, by taking samples of fruit in large quantities, and from places where the arsenic had been used most freely, and then testing these large samples in the laboratory for arsenic: the other involved the considerations of all the possible methods by which arsenic could be conveyed to the fruits, and then by observation and examination either confirm or refute these possibilities.

I shall consider this second line of study first. In what way could the arsenic be lodged upon the fruit? The possibility of its absorption by the plant, and deposition in the fruit, I assume as fully settled by experiments in the negative. I shall refer to this in another connection, and for the present drop it with a simple denial. Could any atmospheric agencies transport it and lodge it upon the fruit? Could the winds blow it about and deposit it there? The method universally adopted in applying it precluded this possibility, as it seemed to me. It was applied as thick paste deposited upon pieces of shingles or shakes placed upon the ground. This paste hardened or thickened on exposure to the air or sun, and in no case did it become crumbly or powdery, or in a condition to be blown about. It remained a coherent mass upon the shingle where it was placed. The grapes were clean, and a strong lens failed to show any dust lodged upon them. The arsenic does not evaporate or volatilize at ordinary temperature, and so could not condense again upon any near object. No rain fell during the time of exposure, so that water could not, in any way, have transported the poison. As the result of examinations of this sort, I could

not escape the conclusion that there was no probability, and hardly the faintest possibility, that any atmospheric agency could transport the poison. Could any animal do it? Could the grasshoppers themselves do it? This was quite possible, and the examination alone could decide.

In one or two cases I observed that the grasshoppers, having got into the mass when very thin and syrupy, had afterwards crawled upon the leaves. Their course could be accurately followed on the leaves, because the arsenic, in this moist condition, killed the substance of the leaf touched, so that a dry and brown line on the leaf gave the track of the grasshopper. Cases of this sort were extremely rare, and in no case could I see the mark of the grasshopper upon the grapes themselves. If the arsenic had touched them at any point when green, a dead and gnarled spot would have been formed. After recognizing the tracks of the grasshoppers on the leaves, great care was taken in the examination, but no second case was found. A theory had been suggested that the grasshopper might have vomited the contents of his stomach, including the arsenic, upon the grapes, and in this way the poison be communicated to the consumers of the fruit. Close observations failed to discover any instances of this. The habits of the pest were such as to make such an accident most improbable. Immediately upon eating the arsenic, he sought the shade. Mr. Goodman, of Fresno, assured me that he had watched them carefully, and in every case immediately upon eating the poison, they had sought the shade, or water, if any happened to be near. A striking confirmation of this fact is found in the location of the dead bodies of the grasshoppers. They are invariably to be found under the vines, hardly a single one was to be seen until the vines were moved, and then hundreds were in full view under a single vine. I watched carefully for dead grasshoppers in the clusters of the grapes. I can only say that I found none. It may be that now and then a dead grasshopper may have become entangled in the bunches, but I can assert that it must have been a rare occurrence. In some places, I observed a very considerable amount of grasshopper excrement upon the foliage and among the clusters of the grapes. I collected a quantity of this excrement from the foliage, and took it to my laboratory for examination. The subsequent examination of this excrement showed that it did not contain a trace of the poison, even when large quantities were taken, there were no traces of the arsenic to be discovered by the chemical tests. The bodies of the dead grasshoppers, on the other hand, gave large amounts of the arsenic, leaving no doubt as to the efficiency of the remedy.

The results of my observations in the vineyards gave only negative indications. As a final test, I picked myself in spots where the arsenic had been used most freely, from thirty to forty pounds of grapes in each of the different vineyards.* These were examined for arsenic. In none did I

*In this examination of the grapes for arsenic they were carefully and repeatedly washed with a dilute solution of caustic potash and finally with pure water. The wash water and alcohol were evaporated to a small volume and then tested by Marsh's apparatus for the presence of arsenic. In two samples out of the three taken, a very faint trace of arsenic was discovered, estimated to be equal in the one instance with part of a grain of white arsenic from thirty to twenty pounds of grapes. This test was not apparent upon the first heating of the tube, but only after the lapse of considerable time. In carrying out this examination I was compelled to consider anew the question of removing arsenic from metallic zinc. It is generally agreed among chemists that a method proposed up to this time had failed to remove the arsenic entirely from the zinc. I was led from certain considerations to the change of zinc stirred into the molten zinc to be purified. The chloride of zinc was readily prepared by the action of arsenic acid chloride on the molten zinc when exposed to the action of the atmosphere. By continually stirring this chloride of zinc into the molten zinc, the result is quickly and perfectly removed. Zinc which before treatment gave a strong reaction for arsenic, after the treatment failed to give the reaction, even when put to the severest test. A very great quantity of metallic arsenic was added to

obtain more than the faintest trace of this substance, an amount absolutely inappreciable, and too small to have any perceptible action upon the human body. This conclusion, as soon as reached, was communicated to Mr. Charles A. Wetmore, Chief Executive Viticultural Officer, and by him published in the dailies of the State.

Some other interesting and important questions still remained to be considered.

If the arsenic should be left upon the soil, what dangers are to be anticipated to the vines, trees, or future crops? What possibilities are there of the arsenic being taken into solution by the water and then entering the springs, wells, or streams which may be used for domestic purposes? It would also be a matter of interest to inquire whether arsenic is known to occur in any appreciable quantity in any arable soils: are there any well authenticated instances in which arsenic is known to have been applied to a soil by accident, or otherwise, and with what result? Does arsenic occur in any spring water, or in any mineral spring that has been used by man for any period, and with what results?

* Vohl found a very appreciable quantity of arsenic in the boiler scale of a steamer that ran from Cologne to Mühlheim, on the Rhine.

† Walchner, for many years member of the Mining Directory of the Grand Duchy of Baden, had occasion to investigate the iron ores of that country, and found that they almost universally contained arsenic in small quantities. As these ores were undoubtedly deposited from mineral springs, it occurred to him to test the deposits of iron springs still in existence. He found that these springs, or rather that iron deposits from them, contained arsenic. He then extended his observations to some of the celebrated mineral springs of Germany. He examined the deposits of the iron springs of the Black Forest (Griesbach, Rippoldsau, Treinach, Rothenfels, and Caunstadt), and also of Wiesbaden, Schwalbach, Ems, Pyremont, Lamscheid, and of Brohlthals, near Andernach. The iron deposits of those springs all contained arsenic and other metals, and it is supposed that some of their medicinal properties may be due to this fact.

Walchner, having called the attention of chemists to this occurrence of arsenic, further investigation showed that its presence had been overlooked in very many cases. He began the investigation of soils in the neighborhood of Heidelberg, and found abundant and clear evidence of the presence of arsenic in those ferruginous soils.

‡ Professor Will, in a very careful and exhaustive analysis of the springs of Rippoldsau, confirms the statements of Walchner. He found very considerable quantities of arsenic in the deposits from these springs.

§ Professor Bunsen found that twenty-five out of thirty-eight mineral springs, in the Grand Duchy of Baden, contained arsenic. Many other mineral waters are known to contain this substance. It seems almost impossible to escape the conclusion that arsenic is widely distributed in nature, and when proper methods have been taken to discover this sub-

the zinc, and samples of the zinc taken every five minutes. It required two and one half hours treatment to remove one hundred and twenty-five grains of arsenic from one and one half kilograms of zinc. Each fresh addition of chloride of ammonium liberated when stirred into the zinc a very distinct odor of garlic, and was a means indicating the presence of the arsenic. Shortly after the disappearance of the garlic odor the zinc was found to be free from arsenic. A four hours' treatment in Marsh's apparatus failed to show the faintest trace of arsenic.

* *Berichte der Deutschen Chemischen Gesellschaft*, Berlin, 1877, p. 1813.

† *Liebig's Annalen der Chemie und Pharmacie*, vol. 61, p. 205.

‡ *Liebig*, an. 61, p. 181.

§ *Fresenius Zeitschrift für Analytische Chemie*, 1871, p. 436.

stance in connection with iron deposits, it will almost certainly be found there.

Arsenic is known to be present in the immediate neighborhood of many metallurgical works.

An analysis of the soil in the neighborhood of the Muldener Hütte in Freiberg by *Stöckhardt, showed the presence of arsenic for a distance one thousand yards and more from the works. It could not well be otherwise, when thousands of tons of ore have been roasted, which contained arsenic. This substance is almost entirely expelled, and passes into the atmosphere, and in a short time is brought to the earth again, in the neighborhood of the smelting works.

The presence of arsenic in soils is not a new discovery, but has been a practical problem for generations. This problem has been the subject of scientific investigation, especially during the last thirty or forty years, and the most important points well considered.

†Stöckhardt remarks, in regard to the action of the fumes of arsenic in the neighborhood of the works in Freiberg: "Even in the near neighborhood of the arsenic works, at a distance of sixty to seventy yards, the fields were everywhere cultivated, either for meadow or forage crops, and field crops, and did not appear to be specially affected, comparing similar slopes and similar soils. Among the grains, the oats seemed to be the most sensitive to the fumes, etc."

This subject was taken up by Dr. McMurtrie,‡ the chemist of the Agricultural Department in Washington. Paris green had been used at the time in considerable quantity for the potato pest, and the question of danger to the vegetation was then raised. He was unable to find any arsenic in the tuber of the potato. These experiments were continued, and varying quantities of arsenic, in the form of Paris green, arsenite of potash, and arseniate of potash, were used. He came to the conclusion that nine hundred pounds of Paris green to the acre, four hundred pounds of arsenite of potash, and one hundred and fifty pounds of arseniate of potash, might be applied without injury to the plants.

I will not attempt to give a full synopsis of the literature upon this subject, but will content myself with a brief summary of the most important recent investigations.

Dry arsenic sprinkled upon the foliage of a plant has but little, if any, action on the plant. Fumes of arsenic under a tree, or in contact with a hardy plant, seem to be entirely without action on the plant. A solution of arsenic is a poison to the plant, and all plants are quickly affected by it. Very small amounts may be absorbed by plants—succulent plants being most sensitive to the poison—and but little change is observed. A careful analysis of such plants may show a trace of arsenic. §Jäger found tests for arsenic in certain dried plants, which had been grown in soil containing arsenic. ||Von Gorrop-Bessanez detected the presence of this element in one hundred and forty grammes of dried buckwheat straw, grown in a soil to which the arsenic had been added—thirty grammes As_2O_3 intimately mixed with 30.7 cubic decimeter soil.

Professors Nobbe, Baessler, and Will, in the Landwirthschaftlichen Versuchs-Station, 1884, pages 381-419, have taken up the action of arsenic

* Di Beschädigung der Vegetation durch Rauch v. Schröder and Reuse, p. 53.

† Ueber die Einwirkung des Rauches der Silberhütten auf die benachbarte Vegetation. Polytechnisches Centralblatt, 1850, p. 267, and V. Schröder and Reuss, p. 20.

‡ Report of the Commissioner of Agriculture, 1874, p. 152. Report of the Commissioner of Agriculture, 1875, p. 144.

§ Ueber die Wirkungen des arseniks auf Pflanzten, Stuttgart, 1864.

|| Liebig's Annalender Chemie and Pharmacie, vol. 127, p. 248.

upon plants, and in a prolonged and exhaustive investigation, have come to the following conclusions:

I. "Arsenic in solution is an exceedingly active poison to plants. The addition of one one millionth to the culture solution produces an appreciable disturbance of growth.

II. "The element enters in very *small* quantities only into the plant; it is impossible to introduce an appreciable quantity.

III. "The action of arsenic proceeds from the roots upward, whose protoplasm is disorganized and deranged in its osmotic action; the rootlet dies without growth.

IV. "The parts above ground show the action of the arsenic first by strong wilting, recovering slowly, followed by death.

V. "By obstructing the transpiration (*i. e.*, shutting off the light, placing in a warm, moist room, etc.), it is possible to maintain the growth of plants in an arsenic solution for a time, without, however, removing the poisonous action of the arsenic, which asserts itself later."

All investigations seem to agree in this general conclusion. There is no danger of arsenic being taken up in such quality by the plant that injury can result from the use of the plant as food. If very much or even an appreciable amount should be taken up by the plant it must surely die. The sprouting of seeds is destroyed by solutions of arsenic; so that where there is a large amount of this substance in the soil it simply becomes barren.

The danger of contaminating wells will appear small after what has been said upon the wide distribution of this element in nature, and its occurrence in certain mineral waters. We have but few experiments to test the power of soils to retain arsenic. *Von Gorrup-Bessanez used a very small amount of soil and retained 40.15 per cent of the arsenic. It may safely be presumed that a ferruginous or highly calcareous soil would practically retain the whole, so that the water filtered through it, although it might be mixed with the poison, would only contain a mere trace.

A few words of caution should be added to what I have said in regard to the use of this very deadly poison. It is a *poison*, and this must always be kept in mind. It should be gathered up and not left upon the land. If a manufacturing chemist is near he can easily convert it into pure arsenic again. If boiled with wheat or other grain it may be used for poisoning squirrels.

W. B. RISING,
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* Liebig's *Annale der Chemie and Pharmacie*, vol. 127, p. 252.



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